(1)

INSTALLATION RESTORATION PROGRAM

PHASE I - RECORDS SEARCH, HAZARDOUS MATERIALS DISPOSAL SITES

KIRTLAND AFB, NEW MEXICO

PREPARED FOR

UNITED STATES AIR FORCE AFESC/DEV

Tyndall AFB, Florida

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NOVEMBER, 1981

ENGINEERING-SCIENCE

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INSTALLATION RESTORATION PROGRAM, PHASE I: KIRTLAND AFB

Prepared for
United States Air Force
AFESC/DEV
Tyndall AFB, Florida

November, 1981

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November 30, 1981

Mr. Myron Anderson
AFESC/DEVP
Tyndall AFB, Florida 32403

Dear Mr. Anderson:

Enclosed is the Engineering-Science, Inc. (ES) draft report entitled "Installation Restoration Program, Phase I Records Search, Hazardous Materials Disposal Sites, Kirtland AFB, New Mexico." This report has been prepared in accordance with the ES proposal dated May 20, 1981 and Air Force Contract Number F08637-80-G-0009 Call #0004.

Presented in this report are introductory background information on the Installation Restoration Program, a description of the Kirtland AFB installation including past activities, mission and environmental setting, a review of industrial activities at Kirtland AFB, an inventory of major solid and hazardous waste from past activities, a review of past and present waste handling, treatment and disposal facilities, an evaluation of the pollution potential of each identified site, and recommendations for the Phase II Installation Restoration Program.

We appreciate the opportunity to work with you and the other Air Force personnel who contributed information to us for the completion of this assessment.

Very truly yours,

ENGINEERING-SCIENCE, INC.

E J Schroeder

E. J. Schroeder, P.E.
Manager, Solid and
Hazardous Waste

EJS:mlh

Enclosure

EXECUTIVE SUMMARY

The Resource Conservation and Recovery Act of 1976 (RCRA) was promulgated to regulate the generation, transportation, storage, treatment and disposal of hazardous wastes. Simultaneous to the passage of RCRA, the Department of Defense (DOD) devised a comprehensive Installation Restoration Program (IRP) to identify, report and correct potential environmental deficiencies that could result in ground-water contamination and probable migration of contaminants beyond DOD installation boundaries. The IRP has been developed as a three-phase program:

Phase I - Problem Identification/Records Search

Phase II - Problem Confirmation and Quantification

Phase III - Corrective Action

Engineering-Science (ES) was contracted to conduct Phase I of the IRP for Kirtland Air Force Base (AFB).

The on-site portion of Phase I was performed at Kirtland AFB June 30, July 1, and August 17 through 24, 1981. During this period formal interviews were conducted with 70 base personnel familiar with past waste disposal practices, file searches were performed for facilities which have generated, handled, transported, and disposed of waste materials, interviews were held with local, state and federal agencies, and site inspections were conducted at facilities that have generated, treated, stored, and disposed of hazardous waste.

INSTALLATION DESCRIPTION

Kirtland AFB is located in central New Mexico southeast of and contiguous to the City of Albuquerque. The base covers 46,389 acres and contains 742 buildings with 5.6 million square feet of floor space. The basic mission of Kirtland AFB is to provide research, development and training.

Three areas within the base are owned by the Department of Energy (DOE), not the Air force. Facilities in these areas are operated and

maintained by Sandia National Laboratories, a research and development contractor for the DOE. Waste disposal sites and past waste management practices on the DOE property are discussed in this report. The disposal sites that are not on Air Force property are listed separately (Table 4.14 and Appendix I) from recommendations for the IRP Phase II Program.

The Air Force owns an aircraft engine plant (USAF Plant No. 83) located about 6 miles west of Kirtland AFB, just east of the Rio Grande River. This facility is leased to General Electric Company (GE) and the plant site has been included as part of this study. GE and Sandia National Laboratories personnel were cooperative in providing the information on past waste disposal practices that is presented in this report.

ENVIRONMENTAL SETTING

Several environmentally sensitive conditions noted at Kirtland Air Force Base need to be considered when handling and disposing of hazardous waste materials. These are as follows:

- The primary regional aquifer, the valley fill, underlies Kirtland Air Force Base at great depth (400 to 600 feet) west of the Hubbell Springs Fault and apparently at Shallow depth east of the fault (54 feet).
- Kirtland AFB obtains water supplies from municipal sources and from its own well system. The Kirtland well system is comprised of individual wells distributed over the western half of the installation, in contrast to the municipal well system which is composed of wells concentrated in well fields.
- Valley fill unconsolidated sediments are very permeable and are exposed over large areas at ground surface. The valley fill is present in very thick sequences.
- Area precipitation rates are low, potential evapotranspiration rates are substantially higher.

PROCEDURES

A review of all waste generation sources at the base was conducted to determine past disposal methods for hazardous wastes. This review included industrial shop areas, research and development labs, pesticide and herbicide utilization, radioactive waste sources, fire control training

areas, hazardous waste storage areas and Fuels Management areas. Past and present waste materials were identified and the disposal methods used for each source were determined according to base records or interviews. The disposal methods included on-site landfills, surface impoundments, oil-water separators, sanitary sewers, storm sewers, drain fields and off-site non-hazardous waste contract disposal.

Twenty-one disposal sites located on the Kirtland AFB property were identified as containing hazardous material resulting from past waste disposal activities (Figure 1). These sites have been assessed using a rating system which takes into account factors such as site characteristics, waste characteristics, potential for contamination and waste management practices. The details of the rating procedure are presented in Appendix G and the results of the assessment are given in Table 1. Rating scores were developed for the individual sites and the sites are listed in order of ranking. The rating system is designed to indicate the relative need for more detailed site assessment and/or remedial action.

FINDINGS AND CONCLUSIONS

Based on the results of the project team's field inspection, review of records and files, and interviews with base personnel, the following conclusions have been developed. The conclusions are listed by category.

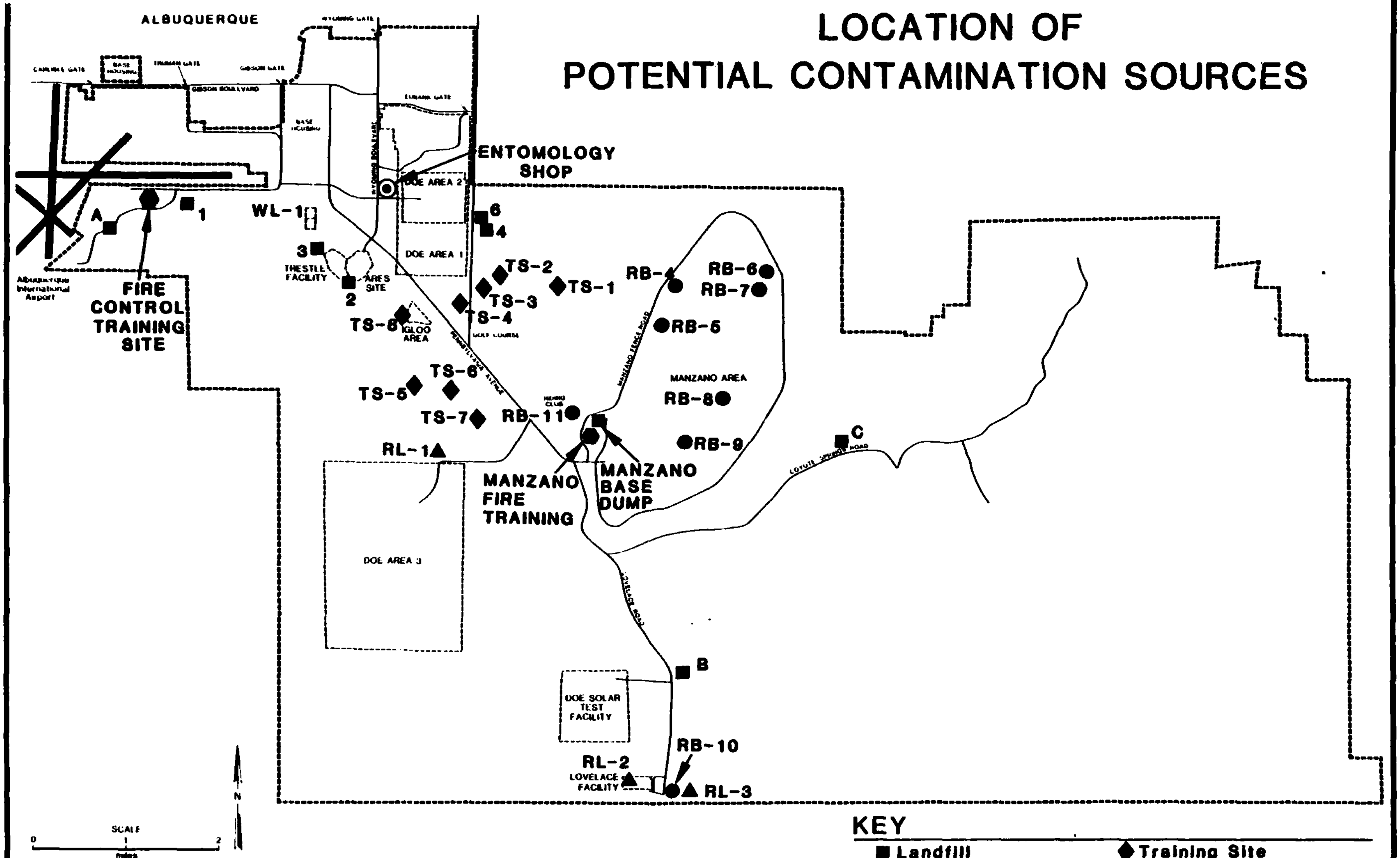
1) Landfill Areas

a) Landfill No. 1 was identified as having the greatest potential for migration of contaminants off site (rating score of 64). The landfill was operated from 1965 through 1975 and is now closed. There is evidence indicating that hazardous materials have been disposed of in the landfill with the general refuse. The landfill is not completely covered and has an exposed face (about 30 feet in height) on the south side as well as several areas where the cover has eroded away or was not installed. A surface drainage discharge (about 50-100 gpm normal flow) which includes wastes from the shop area north of the landfill traverses the landfill and infiltrates into the ground prior to leaving the landfill area. The landfill is located within 500 feet of a drinking water well and within 400 feet of the base boundary. The distance to ground water is approximately 500 feet.

FIGURE 1

KIRTLAND AFB

LOCATION OF POTENTIAL CONTAMINATION SOURCES



KEY

- ■ Landfill
- Waste Lagoon
- ⬢ Fire Training Site
- ◆ Training Site
- ▲ Radioactive Lagoon
- ● Radioactive Burial Site

SOURCE: KIRTLAND AFB DOCUMENTS

TABLE 1

PRIORITY RANKING OF POTENTIAL CONTAMINATION SOURCES

Rank	Site Name	Score
1	Landfill No. 1	64
2	Fire Training Area	50
3	Landfill No. 4	49
4	Landfill No. 2 & 3	47
5	RB-11	46
(6)	RL-1	45
(6)	Landfill A	45
7	TS-1 through TS-8	43
8	Landfill No. 6	42
(9)	Wastewater Lagoons	41
(9)	RB-7	41
10	Entomology Shop	39
11	Landfill B	37
12	Manzano Fire Training Area	36
13	Manzano Dump	34
(14)	Landfill C	32
(14)	RB-10	32
(15)	RL-2	30
(15)	RL-3	30
16	RB-4, RB-5, RB-6, RB-8, RB-9	23

Note: This ranking was performed according to the Hazardous Evaluation Methodology described in Appendix G. Individual site rating forms are in Appendix H.

b) Other landfills (No.'s 4, 2, 3, A, 6, B, the Manzano Dump and C ranked in descending priority) are less likely to create potential contamination problems. Landfill No. 4 was operated as a general refuse disposal site from 1964 through 1969 and Landfill No. 2 was operated as a general refuse disposal site from 1943 through 1965. Part of the material in Landfill No. 2 was relocated in the mid-1970's to accomodate construction of the trestle test facility and this relocated waste material has been designated as Landfill No. 3. Landfills No.'s 4, 2, and 3 are closed sites with good cover. The presence of hazardous materials in these sites should be small based on the study findings. The rating scores n these three sites are No. 4 - 49, No. 2 - 47 and No. 3 - 4

Landfill No. 6 is an active landfill and c col practices prevent disposal of any significant quantities hazardous materials at this site. The rating score for I ll No. 6 is 42.

Landfills A, B and C and the Manzano Dump are all past sites where refuse has been dumped. No hazardous materials could be identified from records, interviews or the site inspection. The Manzano Dump has been closed with an earth cover, however, the other sites were not closed. All the sites are relatively small, five acres or less. The rating scores received by these sites are Landfill A - 45, Landfill B - 37, Landfill C - 32 and the Manzano Dump - 34.

2) Radioactive Burial Sites

a) Low-level solid radioactive wastes have been buried at three locations on Kirtland AFB (RB-11, RB-7 and RB-10 ranked in descending priority). RB-11 is a closed site located by the riding club and was used for disposal of radioactive test animals and small amounts of acids, mercury, cyanides and silver. This site is approximately 1,500 feet from a drinking water well and the ground water depth in this area may be only 50 to 60 feet (subject to confirmation). The rating score received by this site is 46.

RB-7 is a closed site in the Manzano area which was used to dispose of miscellaneous shop materials (contaminated by low level radioactivity) from the Manzano operations. The closest drinking

water well is over a mile away. RB-7 received a rating score of 41.

RB-10 is an open site used for disposal of low level radioactive contaminated test animals and tissues. The site is located by the Lovelace Facility and is within 500 feet of the base boundary. The nearest active drinking water well is over three miles away and the ground-water depth in this area is believed to be about 50 feet (subject to confirmation). The RB-10 site received a rating score of 32.

b) Radioactive liquid holding tanks (RB-4, 5, 6, 8 and 9), the dirt mounds and the mine shafts appear to pose little potential for water contamination problems. RB-4, 5, 6, 8 and 9 are emergency underground holding tanks which would only receive contaminated material (low-level radioactive liquid waste) in the event of an emergency. The waste material would then be removed from the tanks and disposed of at another location. The rating score for these sites was 23.

Recent investigations of the dirt mounds and mine shafts have not detected any radiation levels above background level and no evidence has been found to indicate hazardous materials are present at these locations.

3) Fire Training Area

a) The main base fire training area (located by the FAA tower) ranks high as a potential contamination site because of the large quantity of JP-4, foam and waste chemicals that were used at the old fire training pit and the very permeable soil conditions. Fire training procedures have changed; the use of waste chemicals has been eliminated, fire training is conducted less frequently and a concrete liner has been constructed in the pit. However, the past practice have probably left chemical materials in the soil. Therefore, this site received a rating score of 50.

b) The old fire training area by Manzano has a rating score of 35 and is not considered to have as great a potential for contaminant migration as the main base fire training area. The Manzano fire training area was used less frequently than the main base site and no waste chemicals were known to be burned at the site.

4) Surface Impoundments

a) Three surface impoundments have been used for disposal of low-level radioactive wastes (RL-1, RL-2 and RL-3). RL-1, located north of DOE Area II, is a closed site and does not have a liner. RL-1 is located within 1,000 feet of a drinking water well. The ground-water level in this area is about 600 feet deep, and it is unlikely that contaminants have migrated into the ground-water system. The rating score for RL-1 is 45.

RL-2 and RL-3 are active sites located by the Lovelace facility. Both sites have liners although the liner in RL-2 may have leakage. The nearest active drinking water well is over three miles away and the ground-water depth in this area is believed to be about 50 feet (subject to confirmation). The lagoons are located approximately 1,000 feet from the base boundary. Both RL-2 and RL-3 received rating scores of 30.

b) WL-1 is a lagoon used for treatment of sanitary waste from portions of the base. The basin has a concrete liner on the side walls and an earth bottom. The lagoon should not contain any significant quantity of hazardous waste. The rating score for WL-1 is 41.

5) Training Sites

a) The potential for migration of radionuclides from the INWS training sites (TS-1 through 8) exists since the sites are located in permeable soils. Migration of radionuclides in saturated soil is unlikely due to the low rainfall and high evapotranspiration rate. The rating score for these sites is 43.

6) Entomology Shop

Waste water from the sink drains at the Entomology Shop has been discharged to a french drain outside Building 20684 since 1957. The waste water is generated by rinsing empty pesticide and herbicide containers (5-gallons or less) and rinsing and cleaning spraying equipment (hand held). The soils around and beneath the french drain are probably contaminated with waste herbicides and pesticides and the continuous addition of water into the french drain could create eventual migration of the contaminants into the ground water. The ground water in this area is approximately 600 feet deep and the nearest well is 4,000 feet away. This site received a rating score of 39.

RECOMMENDATIONS

The following recommendations are made to further assess the potential for contaminant migration from waste disposal areas at Kirtland AFB.

Recommendations for Phase II

First Priority

1) Monitoring for leachate generation and characterization is recommended at Landfill No. 1. Since the groundwater aquifer is quite deep in this area, it is recommended that the unsaturated zone below the landfill be monitored by installing four lysimeters around the fill (one on each side and close to the stream that traverses the site). The lysimeters should be installed at an angle to extend under the landfill. If water is detected by the lysimeter then samples should be collected and analyzed for the Interim Primary and Proposed Secondary Drinking Water Standards, Priority Pollutants, nitrite and Total Organic Carbon (see Appendix J for list of analyses).

Second Priority

1) It is recommended that the unsaturated zone be monitored beneath Landfill No.'s 2, 3 and 4 and radioactive waste burial site RB-11. The monitoring procedure should be similar to that recommended at Landfill No. 1.

2) Soil testing should be performed at the fire training area near the FAA tower. Approximately nine soil borings about 10 feet deep should be taken in a grid area of 100 feet square. A control boring sample should also be obtained in a non-contaminated area close to the fire training pit. The soil samples should be collected for analyses at three locations per boring (1, 5 and 10 feet). Analyses should consist of a water extraction and then analyses for TOC and the Interim Primary Drinking Water Standards.

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ACKNOWLEDGEMENTS

Engineering-Science, Inc. (ES) gratefully acknowledges the efforts and valuable assistance provided by U.S. Air Force personnel (both military and civilian) during the course of this project. The willing cooperation, guidance and assistance provided by Mr. C. E. Richardson, Kirtland AFB Point of Contact, and Mr. Myron Anderson, Project Officer, are especially appreciated. Numerous other Air Force personnel including Mr. D. C. Helmberger, Mr. H. W. Caughman, Captain Bob Senchy, Captain David Hunter, and Mr. Jelli DeBorn and their staffs are also thanked for their contributions.

SECTION 1

INTRODUCTION

SECTION 1
INTRODUCTION

BACKGROUND

The discharge, disposal, and storage of solid wastes into or on the land surface is regulated by state and federal laws. The key legislation governing the management and disposal of solid waste is the Resource Conservation and Recovery Act of 1976 (RCRA). The Act was promulgated to regulate the generation, transportation, treatment, storage and disposal of hazardous wastes; to phase out the use of open dumps for disposal of solid wastes; and to promote the conservation of natural resources through the management, reuse or recovery of solid and hazardous waste. Regulations and implementation instructions of RCRA are continuing to be developed by the U.S. Environmental Protection Agency (EPA).

Under RCRA Section 3012 (PL 96-482, October 21, 1980), each state is required to inventory all past and present hazardous waste disposal sites. Section 6003 of RCRA requires federal agencies to assist EPA and make available all requested information on past disposal practices. It is the intent of the Department of Defense (DOD) to comply fully with these as well as other requirements of RCRA.

AUTHORITY

Simultaneous with the passage of RCRA, the DOD devised a comprehensive Installation Restoration Program (IRP). The purpose of the IRP is to identify, quantify and correct potential environmental deficiencies that could result in ground-water contamination and probable migration of contaminants beyond the DOD installation boundaries. In response to RCRA and in anticipation of the Comprehensive Environmental Response Compensation and Liability Act of 1980 (Superfund), the DOD issued the directive DEQPPM 80-6 requiring identification and quantification of hazardous waste disposal sites on DOD agency reservations, and thereafter the implementation of remedial actions for any potential migration of hazardous contaminants from the installation.

PURPOSE AND SCOPE OF THE ASSESSMENT

The Installation Restoration Program has been developed as a three-phased program as follows:

Phase I - Problem Identification/Records Search

Phase II - Problem Confirmation and Quantification

Phase III - Corrective Action

The Problem Identification/Records Search (Phase I) is directed towards providing answers to the following questions:

1. What hazardous materials and wastes have been generated or identified on the installation?
2. How have the wastes been managed?
3. Was the waste management procedure adequate to immobilize, contain, treat, destroy or detoxify the waste material?
4. By what routes or means (if any) can the wastes migrate off the reservation?
5. Which identified sites are recommended for further investigation in Phase II, Problem Confirmation and Quantification?

The purpose of this report is to summarize and evaluate the information collected during Phase I of the IRP.

Phase I Project Description

The goal of the first phase of the program was to identify the potential for environmental contamination from past waste disposal practices at Kirtland AFB, and to assess the probability of contaminant migration beyond the installation boundary. The activities undertaken by Engineering-Science (ES) in Phase I included the following:

- Review site records
- Interview personnel familiar with past generation and disposal
- Inventory wastes
- Determine quantities and locations of current and past hazardous waste storage, treatment and disposal
- Define environmentally sensitive conditions at the base
- Evaluate past disposal practices and methods
- Conduct field inspection
- Gather pertinent information from federal, state and local agencies

- Assess potential for contamination
- Determine potential for materials to migrate off site.

In order to perform the on-site portion of the records search phase, ES assembled the following core team of professionals:

- E.J. Schroeder, Environmental Engineer and Project Manager, MSCE, 14 years of professional experience
- J.R. Absalon, Hydrogeologist, BS Geology, 8 years of professional experience
- D.G. Johnson, Environmental Engineer, MSCE, 4 years of professional experience
- R.E. Mayfield, Environmental Engineer, MSCE, 4 years of professional experience
- R.M. Reynolds, Chemical Engineer, BSChE, 8 years of professional experience

More detailed information on these individuals is presented in Appendix A.

The on-site portion of the Records Search phase was performed at Kirtland AFB June 30, July 1, and August 17 through August 24, 1981. During this period formal interviews were conducted with approximately 70 base personnel. File searches were conducted within on-site organizations which generate, handle, transport, and dispose of waste materials. Field reconnaissance was conducted at all identified facilities on the base that treated, stored or disposed of hazardous materials and one site located off-base (an aircraft parts manufacturing plant). These facilities included landfills, waste treatment facilities, material storage areas, laboratories, industrial shops and other support facilties.

SECTION 2

INSTALLATION DESCRIPTION

SECTION 2

INSTALLATION DESCRIPTION

LOCATION, SIZE AND BOUNDARIES

Kirtland AFB is located in central New Mexico southeast of and contiguous to the City of Albuquerque (Figures 2.1, 2.2 and 2.3). The base covers 46,389 acres and contains 742 buildings with 5.6 million square feet of floor space. Present land uses for areas adjacent to the base are as follows:

North - residential area

East - mountainous rural area, national forest

South - Indian reservation, open desert

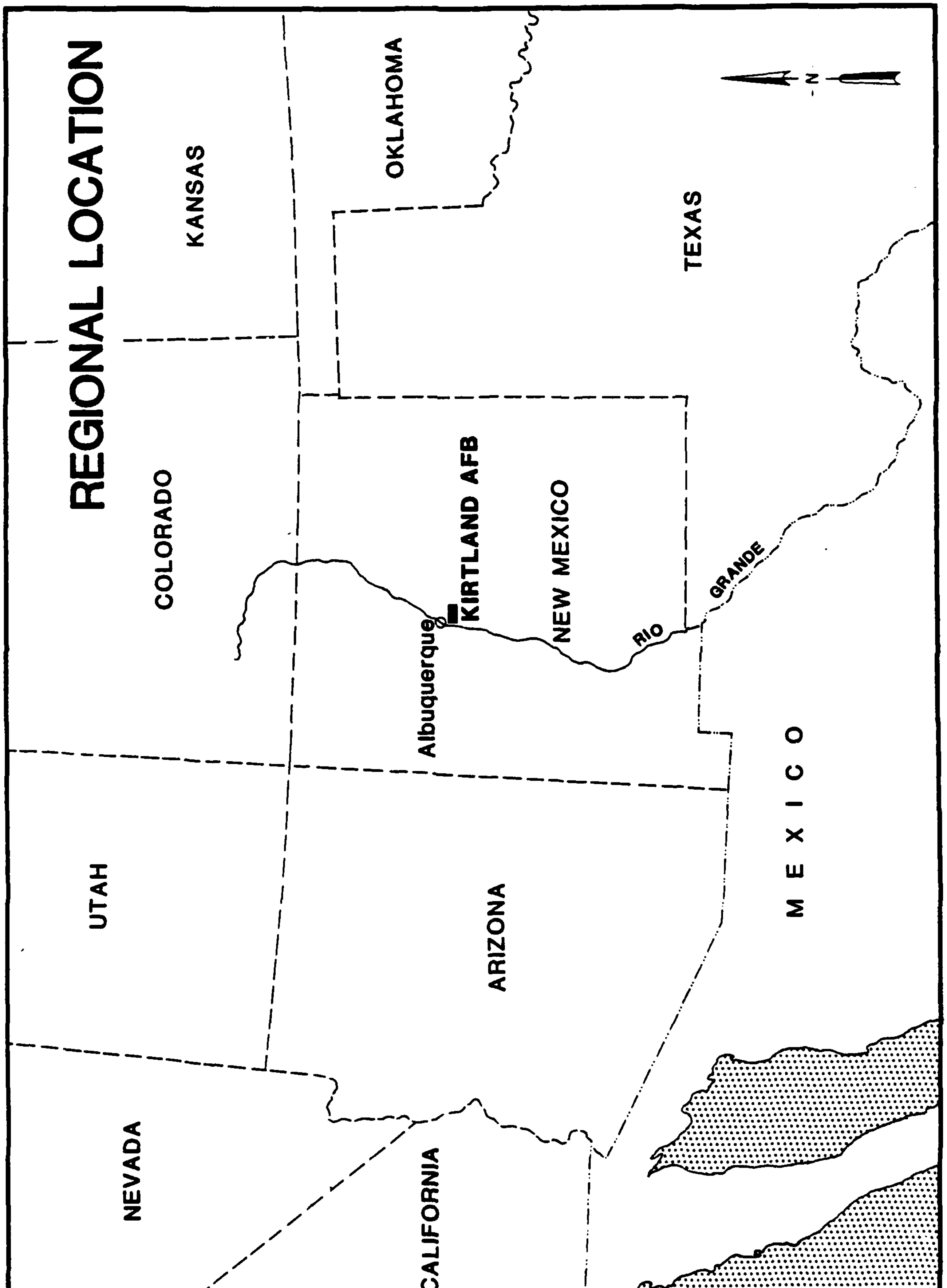
West - residential and business areas

The most prominent physiographic features of this area are the Rio Grande Valley and the Sandia-Manzano Mountain.

Three areas within the base are owned by the Department of Energy (DOE), not the Air Force. Facilities in these areas (DOE Areas I, II and III) are operated and maintained by Sandia National Laboratories, a research and development contractor for the DOE, and are included in the Phase I study. Because of the classified nature of the research activities of Sandia National Laboratories, however, the details of waste generation are less comprehensive than for other sections of the base. Waste disposal sites and past waste management practices on the DOE property are discussed in this report. The disposal sites that are not on Air Force property are listed separately from recommendations for the IRP Phase II Program.

The Air Force owns an aircraft engine plant (USAF Plant No. 83) located about 6 miles west of Kirtland AFB, just east of the Rio Grande River, that is leased to General Electric Company (GE). GE was cooperative in providing the information on past waste disposal practices that is presented in this report.

FIGURE 2.1


REGIONAL LOCATION
KANSAS
OKLAHOMA
TEXAS
COLORADO
KIRTLAND AFB
NEW MEXICO
Albuquerque
RIO
GRANDE
MEXICO
UTAH
ARIZONA
NEVADA
CALIFORNIA
N

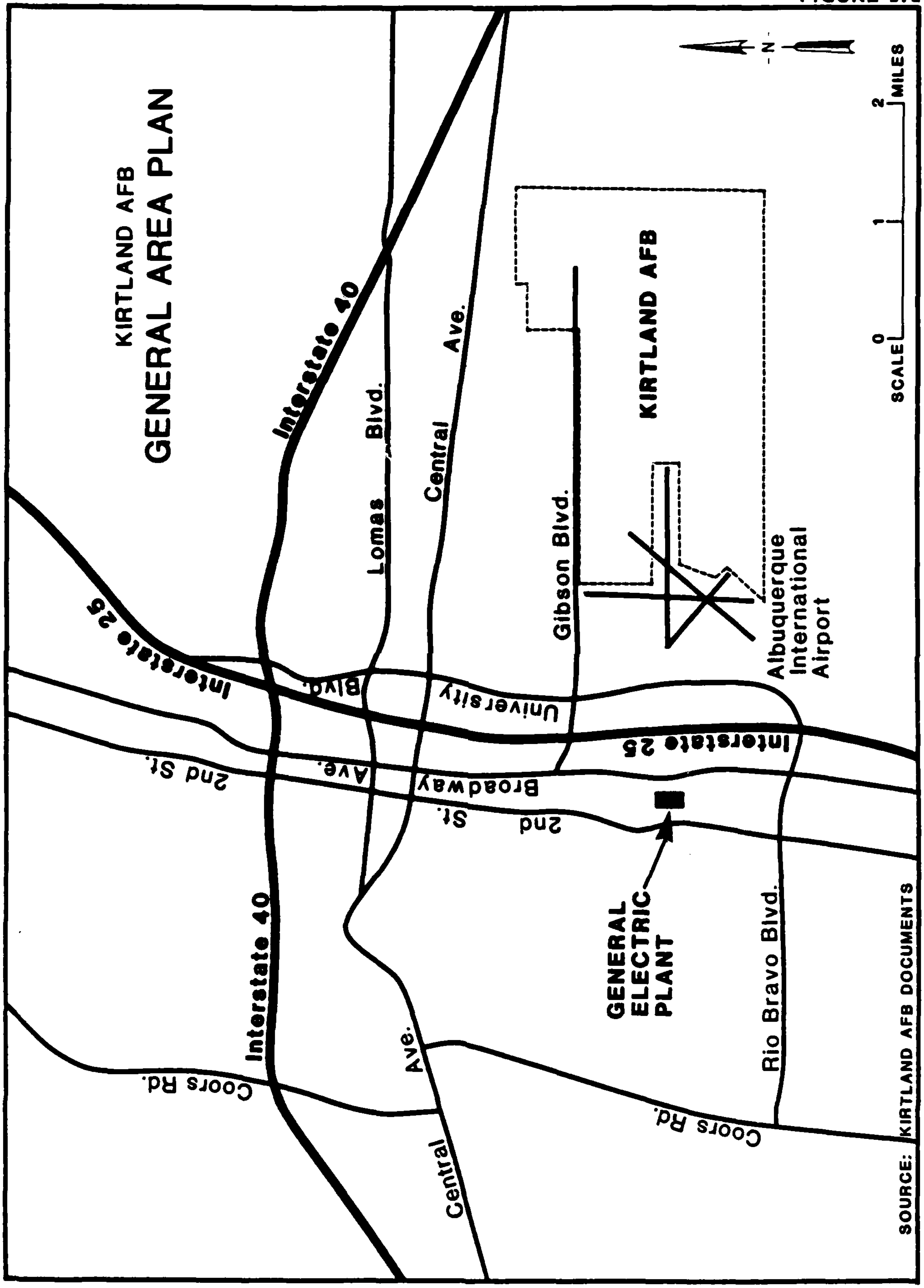
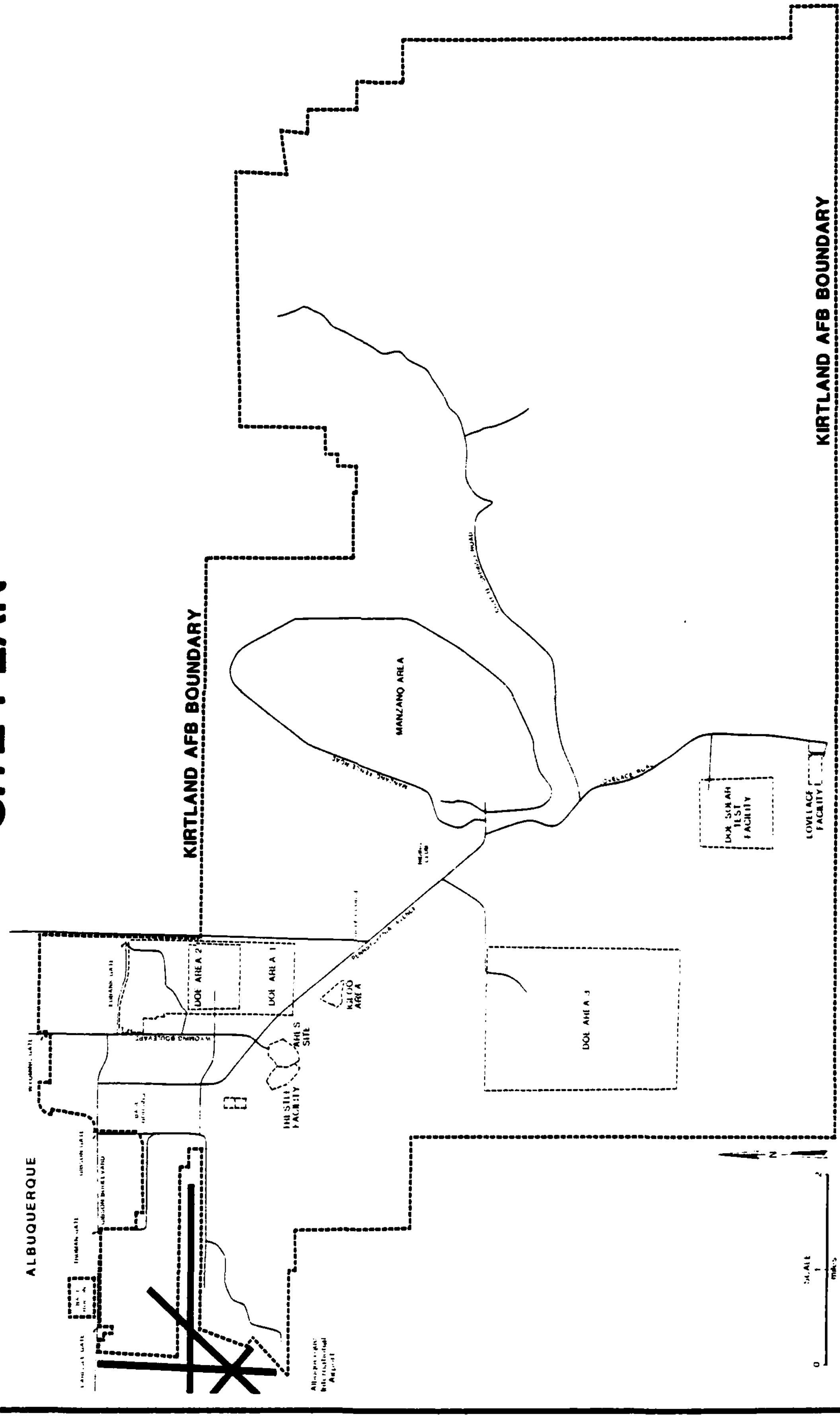

KIRTLAND AFB
GENERAL AREA PLAN
N
SCALE
0
1
2
MILES
Interstate 40
Interstate 25
Lomas Blvd.
Central Ave.
Gibson Blvd.
KIRTLAND AFB
Albuquerque International Airport
University Blvd.
Broadway Ave.
2nd St.
GENERAL ELECTRIC PLANT
Rio Bravo Blvd.
Coors Rd.
SOURCE: KIRTLAND AFB DOCUMENTS

FIGURE 2.3

KIRTLAND AFB
SITE PLAN



NOTE: The Albuquerque International Airport is used jointly by the City and the Air Force.

BASE HISTORY

The initial construction of Albuquerque Army Air Base began in January 1941, almost a year before the United States entered World War II. The name of the base was changed to Kirtland Field in 1942. Four squadrons from the 19th Bombardment Group were assigned to the base as well as the Combat Crew Training School and the Air Forces Advanced Flying School. Other activities on the base during this period included training of aviation mechanics, maintenance operations for the bombardier air depot, convalescent center and a support division for the Manhattan Project.

Sandia Corporation (now Sandia National Laboratories) was located on Sandia Base on the eastern side of Kirtland Field. Its primary mission was development of nuclear weapons which continued as a research function even after the war ended.

Manzano Base was constructed in 1947 as an annex to Sandia Base. The area has been used primarily for storage of aerospace resources.

In 1948 Kirtland Field became Kirtland Air Force Base and in 1971 Sandia Base, Manzano Base and Kirtland Air Force Base merged and became known as Kirtland Air Force Base. The base has evolved essentially into a research, development and training center, hosting various military organizations.

A more complete description of Kirtland Air Force Base history is presented in Appendix B.

ORGANIZATION AND MISSION

The basic missions of Kirtland AFB are to support research and development and for training of the pararescue medics, a flying mission. Kirtland provides technical facilities, procurement and logistic support for many research and development programs and aircraft and pilot facilities including ramp space, taxiways and aircraft barrier systems for a flying training mission. The support function for the base is performed by the 1606th Air Base Wing which contains all the administrative, security, maintenance, housekeeping, pay, medical care, housing, fire protection, legal assistance, law enforcement and logistical support for the base. The 1606th Air Base Wing was established 1 July 1977. The total base workforce of 16,600 includes tenants and 31 contractors.

A description of the tenants and their missions is presented in Appendix B. The tenants of the 1606 Air Base Wing included the following units:

- Air Force Contract Management Division (AFCMD)
- Air Force Weapons Laboratory (AFWF)
- Naval Weapons Evaluation Facility (NWEF)
- Department of Energy/Albuquerque Operations Office (ALO)
- Field Command, Defense Nuclear Agency (FCDNA)
- Air Force Test and Evaluation Center (AFTEC)
- 1550th Air Crew Training and Test Wing (1550 ATTW)
- 1960th Communications Squadron
- 3098th Aviation Depot Squadron (AFLC)
- Detachment 4, 1400 MAS (MAC)
- Defense Contract Administration Services Office/Albuquerque
- Air Force Inspection and Safety Center (Det 1), Nuclear Surety Directorate
- Detachment 23, 17th Weather Squadron (MAC)
- 2D Weather Squadron, Operating Location B.
- 3416th Technical Training Squadron (ATC)
- Missile Electronic Warfare Airborne Group
- Office of Special Investigations (District 17)
- Management Engineering Team (Det 25) (AFSC)
- Nuclear Weapons Training Detachment
- Defense Property Disposal Office (DPDO)
- Defense Investigative Service, District 43 (AFO)
- Project Officer for Nuclear Munitions
- Air Force Logistics Nuclear Support Office (AFLC)
- U.S. Army Corps of Engineers/Albuquerque District, Plant Section
- Air Defense Command Liason Office (ADC)
- Strategic Air Command Liason Office (SAC)
- Civil Air Patrol Liason Office (US AF)
- Tatical Air Command Liason Office (TAC)
- Naval Liason Office (JAWPS)
- New Mexico Air National Guard (Reserve)
- 156th Support Group (Army Reserve)
- 4153rd USAR School (Army Reserve)

- U.S. Army Transponder Unit (WSMR)
- Albuquerque Frequency Surveillance Unit (WASMR)
- Air Force Office of Security Police
- 6597th Student Squadron (Air Force Systems Command)
- Det 2, 4950th Test Wing (AFSC/ASD)
- 1369th Audiovisual Squadron, Det 1
- Army/Air Force Exchange Service
- Albuquerque Seismological Laboratory
- U.S. Customs, Air Support Unit
- Identification, Friend, Foe or Neutral, Joint Test Force (IFFN)
- Sandia National Laboratories
- Lovelace Biomedical and Environmental Institute

SECTION 3

ENVIRONMENTAL SETTING

SECTION 3

ENVIRONMENTAL SETTING

SECTION 3
ENVIRONMENTAL SETTING

The environmental setting of Kirtland Air Force Base is described in this chapter with the primary emphasis directed toward identifying features that may facilitate the movement of hazardous waste contaminants off base. Environmentally sensitive conditions pertinent to this study are highlighted at the end of the Section.

METEOROLOGY

Temperature, precipitation, snowfall and other relevant climatic data furnished by Detachment 23, 7th Weather Wing, Kirtland AFB is presented in Table 3.1. The indicated period of record is 31 years. The summarized data indicate that mean annual precipitation is 8.4 inches and that mean annual snowfall is 10 inches. According to COE et al (1979), potential evapotranspiration (evaporation occurring when no soil-water deficit exists) for the Albuquerque area is 30.9 inches (Figure 3.1). Actual evapotranspiration has been determined to be about 95% of precipitation in this climatic regimes, while the remaining 5% is divided equally between runoff and recharge. (COE, et al., 1979).

GEOGRAPHY

The Albuquerque area is located in the Rio Grande Valley of the Mexican Highland Subdivision of the Basin and Range Physiographic Province. The Rio Grande Valley is a depressed linear feature extending from Colorado to Mexico, and is comprised of several distinct, but related landforms, as depicted on Figure 3.2. Kirtland Air Force Base is located on the East Mesa of the Rio Grande Valley, generally west of the Sandia and Manzano Mountains. The mesa is a prominent physiographic feature, appearing as a level to gently sloping shelf extending from the

TABLE 3.1

WEATHER CONDITIONS AT KIRTLAND AFB, NM

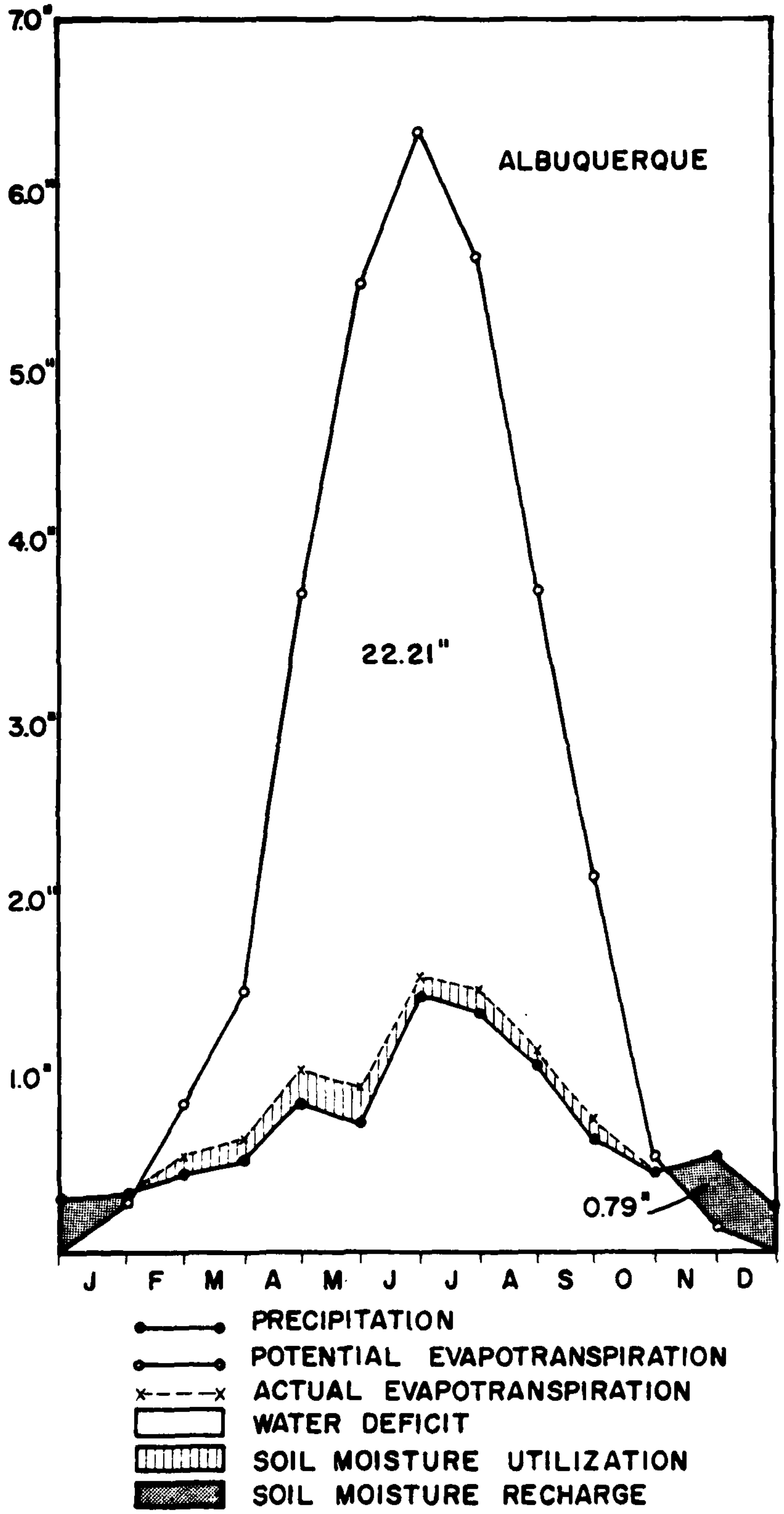
MONTH	TEMPERATURE MEAN MAX (°F)	TEMPERATURE MEAN MIN (°F)	PRECIPITATION MEAN (in.)	PRECIPITATION MAX (in.)	WIND MEAN SPEED (kts.)	WIND PRE-VAILING DIRECTION
January	46	24	0.4*/2.0**	0.9*/5.0**	7	N
February	52	28	0.4/2.0	0.5/4.0	8	N
March	59	33	0.5/2.0	0.8/7.0	9	NNW
April	69	42	0.5/neg	1.7/3.0	9	NNW
May	78	52	0.5/neg	1.1/0	9	S
June	89	61	0.6/0	1.6/0	9	S
July	91	66	1.2/0	1.8/0	8	SE
August	88	64	1.3/0	1.2/0	7	SSE
September	82	58	1.0/neg	1.9/neg	7	SSE
October	71	45	0.8/neg	1.8/1.0	7	SSE
November	56	31	0.4/1.0	0.8/6	7	NNW
December	48	26	0.5/3.0	1.4/14	6	N
ANNUAL	69	44	8.4*/10.0**	1.9*/14**	8	SSE

*Rainfall
**Snowfall
Elevation 5,362 Ft. MSL

Period of Record is 31 years.

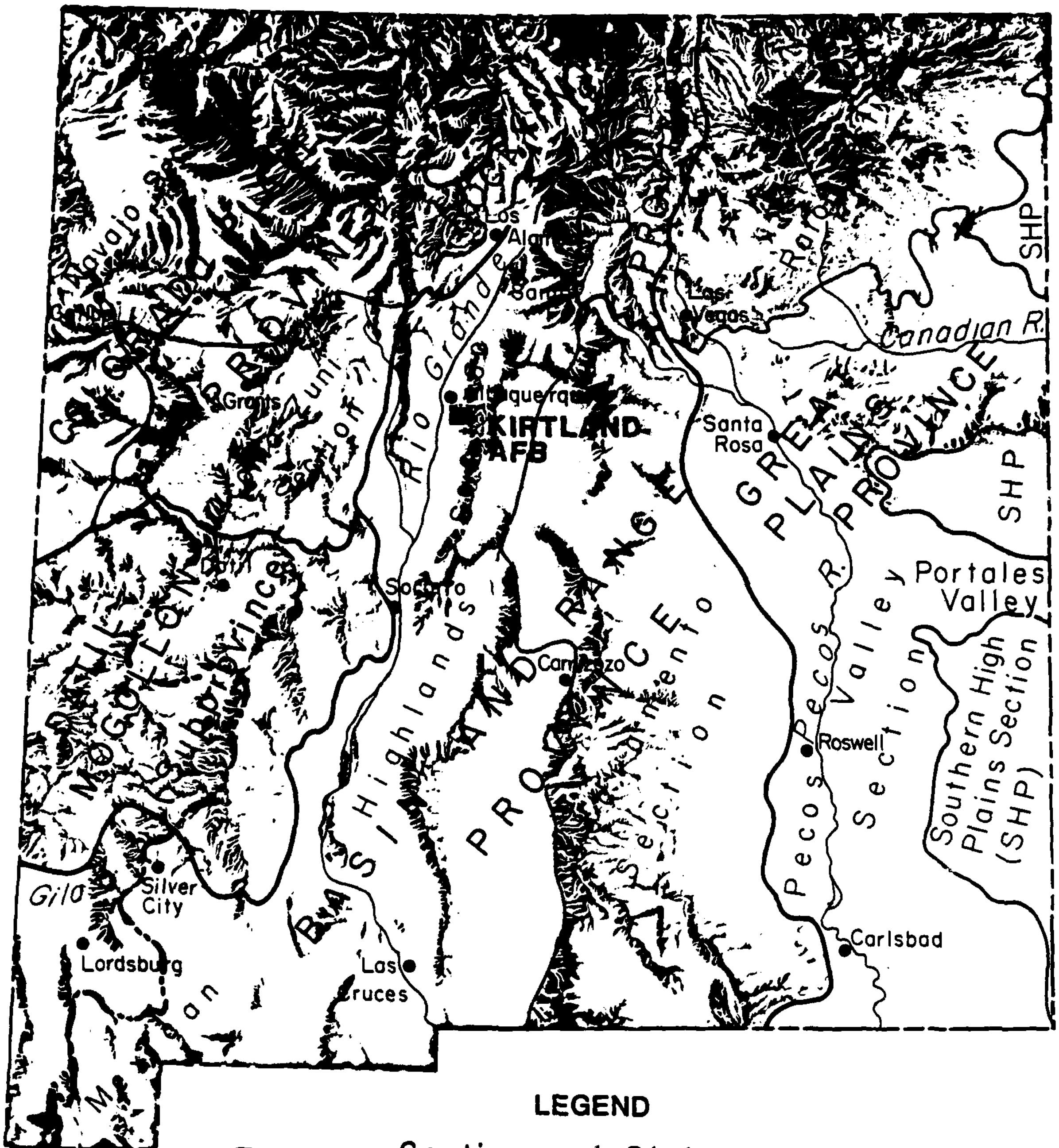
SOURCE: Det 23, 7th Weather Wing

POTENTIAL EVAPOTRANSPIRATION



SOURCE: COE, 1979

PHYSIOGRAPHIC REGIONS OF NEW MEXICO



LEGEND

Continen l Divide
Province and Subprovince boundaries
Section boundaries

-N-

SOURCE: WELLS, LAMBERT AND CALLENDER, 1981

inner valley of the Rio Grande on the west to the Manzano Mountains to the east.

Topography

The Inner Valley of the Rio Grande is the lowest point in terms of surface elevation: 4900 feet MSL, approximately five miles west of the base. The mesa on which Kirtland Air Force Base is located, averages 5,400 feet MSL. The Sandia and Manzano Mountains which form the east valley border are nearly vertical in some areas and reach a maximum elevation of 10,682 feet MSL at Sandia Peak.

Drainage

The study area is drained by a single perennial stream, the Rio Grande. Drainage of land areas such as the mesa, is accomplished by overland flow to arroyos and then to canals, drains (man-made drainage canals or other similar features) or to surface soils by infiltration (Figure 3.3). Water reaching canals or drains is redirected to the Rio Grande. Flooding is not a problem typical of the Kirtland area, although localized flooding may occur for brief periods where surface drainage is restricted within erosional features such as arroyos.

Surface Soils

Surface soils of the installation area have been mapped in studies performed by the USDA, Soil Conservation Service (1977). Six district soil associations have been mapped within installation boundaries and are depicted on Figure 3.4. The soil associations are described in Table 3.2. Base soils are predominately well-drained gravelly sands containing varying amounts of silts and clays.

Geology

The geology of the Albuquerque area has been reported by Kelley (1974 and 1977), Dane and Bachman (1965), Hunt (1978), Grant (1981) and by Bjorklund and Maxwell (1961), among others. A brief review of their work has been summarized in support of this investigation.

Stratigraphy

Geologic units ranging in age from pre-Cambrian to Quaternary have been described in the Albuquerque area and are presented as Table 3.3. The lithologies of these units include unconsolidated materials, sedimentary rocks, metamorphic rocks and igneous materials.

FIGURE 3.3

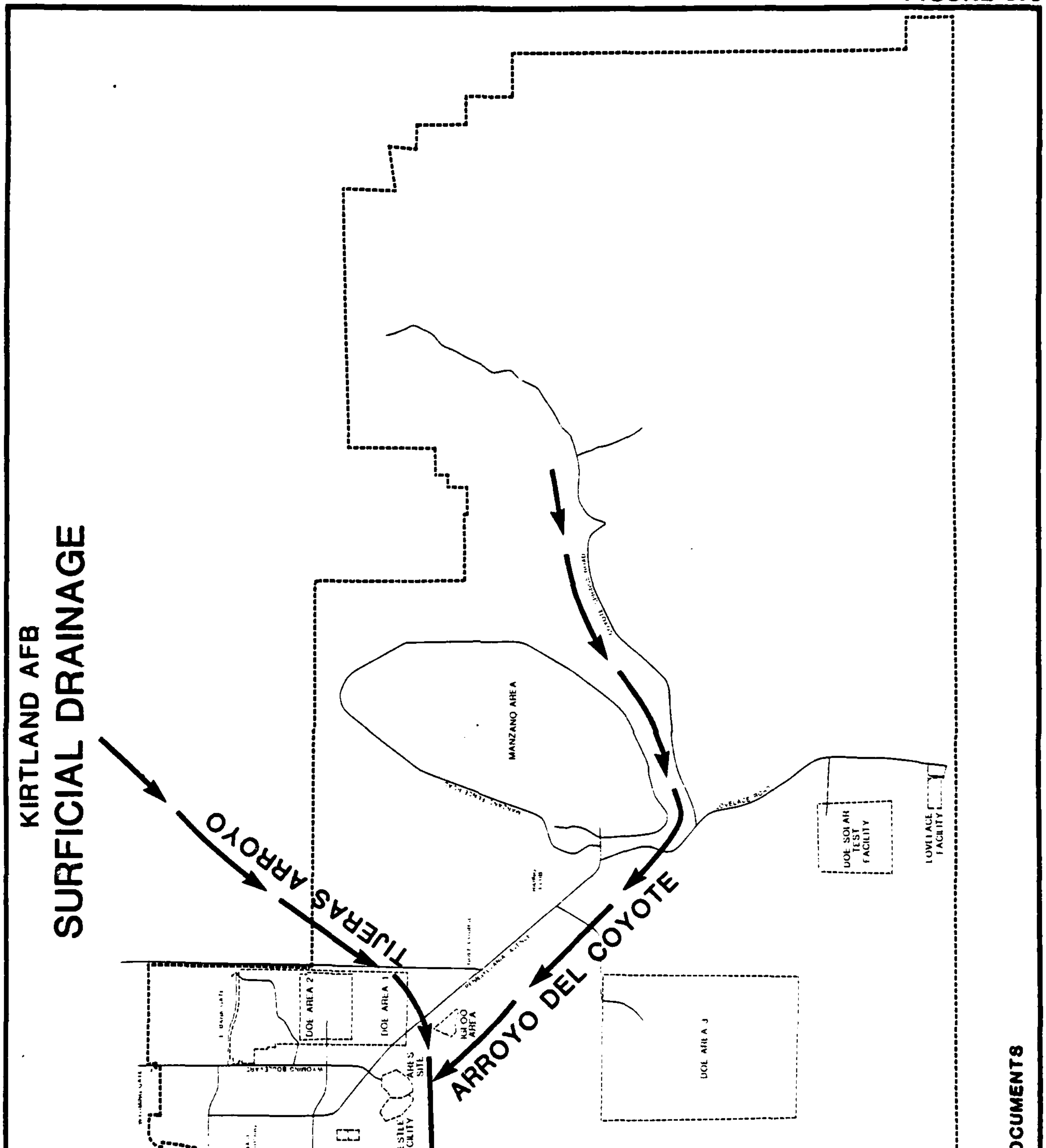

KIRTLAND AFB
SURFICIAL DRAINAGE
TIJERAS ARROYO
ARROYO DEL COYOTE
to Rio Grande
4.5 miles
MANZANO AREA
DOE AREA 3
DOE AREA 2
DOE SOLAR TEST FACILITY
LOVELACE FACILITY
IGLOO AREA
ARES SITE
TRESTLE FACILITY
ALBUQUERQUE
NOTE:
REPRESENTATION IS
RESTRICTED TO
ALIGNMENTS OF MAJOR
DRAINAGE FEATURES
SCALE
SOURCE: KIRTLAND AFB DOCUMENTS

FIGURE 3.4

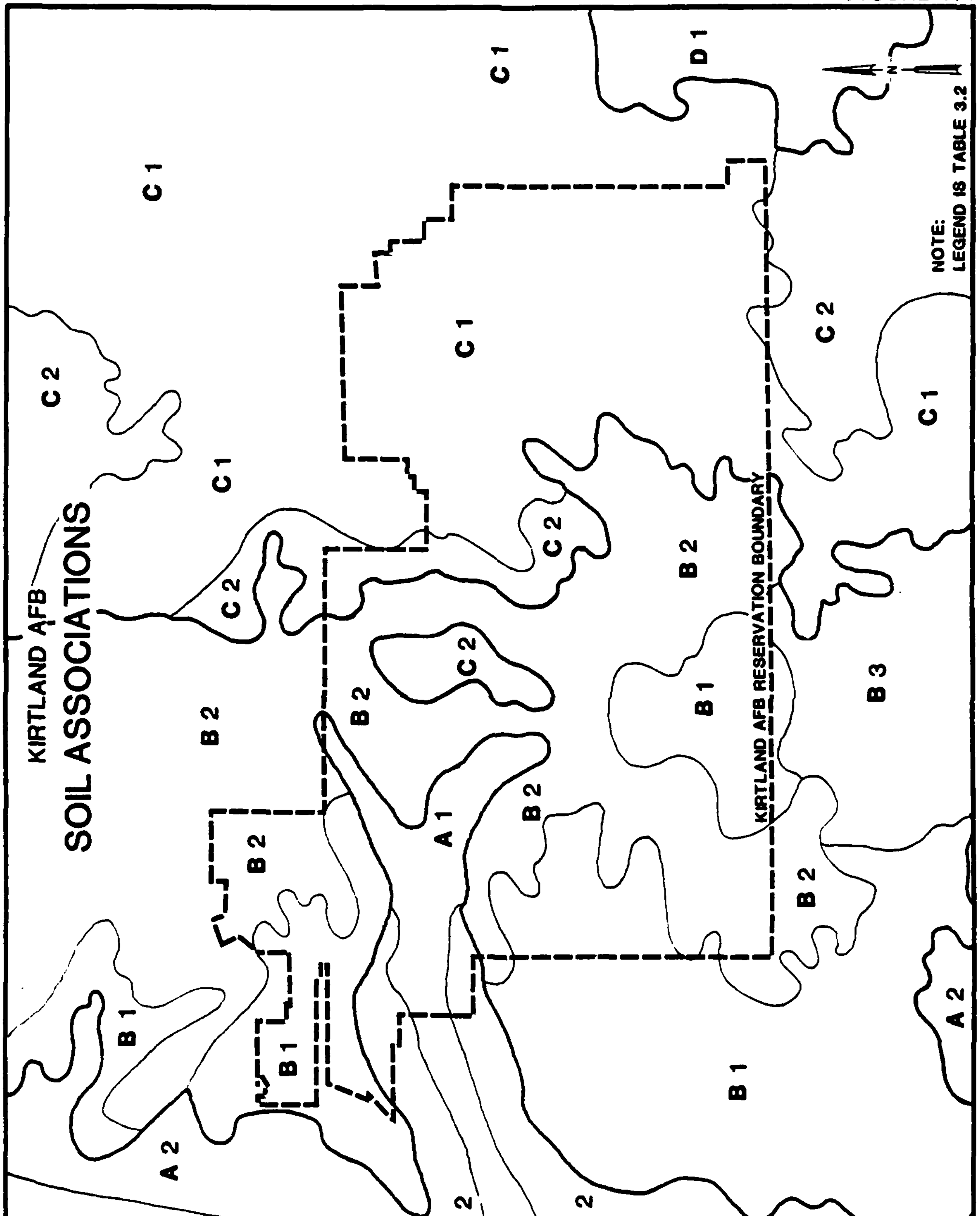

KIRTLAND AFB
SOIL ASSOCIATIONS
KIRTLAND AFB RESERVATION BOUNDARY
NOTE:
LEGEND IS TABLE 3.2
N
A 1
A 2
B 1
B 2
B 3
C 1
C 2
D 1

TABLE 3.2

KIRTLAND AFB SOIL ASSOCIATIONS
MAP LEGEND
(See Figure 3.4)

GROUP	SUB UNIT	ASSOCIATIONS AND DESCRIPTIONS
A		DEEP SOILS ON FLOOD PLAINS & DISSECTED TERRACES
	1	Gila-Vinton-Brazito assoc: well drained loamy soils.
	2	Bluepoint-Kokan assoc: sandy, gravelly soils.
	3	Hautz-Gila assoc: well drained, loamy soils.
B		DEEP SOILS ON ALLUVIAL FANS, MESAS & PIEDMONTS
	1	Madurez-Wink assoc: well drained loamy soils.
	2	Tijeras-Embudo assoc: well drained loamy, gravelly soils.
	3	Latene-Nickel assoc: well drained loamy, gravelly soils.
C		SHALLOW TO DEEP SOILS ON MOUNTAINS & FOOT SLOPES
	1	Seis-Orthids assoc: loamy, stony, cobbly soils.
	2	Kolob-Rock outcrop assoc: loamy, stony soils and rock.
D		VERY SHALLOW TO DEEP SOILS ON UPLANDS
	1	Silver-Witt-Laporte assoc: loamy soils underlain by limestone.

Note: Data represents Upper 60" of soil profile.

SOURCE: USDA, Soil Conservation Service (1977)

TABLE 3.3

GEOLOGIC FORMATIONS IN THE ALBUQUERQUE-KIRTLAND AFB AREA

SYSTEM	SERIES	AGE (M.Y.)*	FORMATIONS	THICKNESS
Quaternary	Holocene		Gravel, sand, mud in lowlands, arroyos, low terraces, and alluvial fans	5-100
	Pleistocene	1.5-2	Gravel, sand, caliche; lava flows	10-50
Tertiary	Miocene-Pliocene	7-20	Sante Fe Formation: sand, clay, and and gravel	0-21,000+
	Eocene	53-54	Galisteo Formation: red and buff sandstone and mudstone	1,000±
Cretaceous	Upper	100	Mesaverde Formation: shale, sandstone, and coal	1,500
			Mancos Shale: shale with thin limestone and sandstone beds	
	Lower	136	Dakota Formation: sandstone, conglomerate, shale	
Jurassic	Upper	154	Morrison Formation: variegated mudstone and sandstone	400-800
			Summerville Formation: red and buff mudstone and sandstone	200
			Todilto Formation: gypsum and limestone	
			Estrada Sanstone: red and buff sandstone	150-200
Triassic	Upper	200	Chinle Formation: red and tan mudstone and claystone	1,500
			Santa Rosa Formation: sandstone and conglomerate	200-400
Permian	Upper	235	Bernal Formation: sandstone, siltstone and limestone	100
			San Andres Formation: limestone	30-100
	Middle	250	Glorieta Sandstone	50-100
			Yeso Formation: red and tan sandstone, limestone, and gypsum	600-800
	Lower	280	Abo Formation: red sandstone and mudstone	600-900
Pennsylvanian		300	Madera Formation: limestone, shale, and sandstone	1,000±
			Sandia Formation: sandstone, shale, and limestone	100-200
Mississippian		340	Arroyo Penasco Formation	0-100
Precambrian		580+ 2,500+	Sandia Granite, gneiss, quartzite, greenstone, and schist	

*M.Y. = millions of years from the beginning of the system or series.

SOURCE: Grant (1981)

Distribution

The areal distribution of significant geologic units relevant to this study are mapped on Figure 3.5, which is modified from the work published by Dane and Bachman (1965). A legend for this figure is included in Table 3.4. Generally, the geology of the north and western portions of Kirtland Air Force Base is dominated by the unconsolidated units, while consolidated geologic units predominate in the eastern half of the installation. A mechanical analysis of terrace gravels and sandy alluvium is included in Table 3.5.

Structure

Kirtland Air Force Base occupies a position straddling a complex geologic setting. The north and western sections of the base are located within the Albuquerque Basin, while the eastern section of the base is located within an area dominated by block faulted mountains. The Albuquerque Basin is a large (4,300-square mile area) complex tectonic element of the Rio Grande Rift, a connected series of structural basins and grabens (down-faulted blocks) arranged en echelon, that extend along a north-south alignment from central Colorado to Mexico. (Figure 3.6). The western margin of the basin is defined by the Rio Puerco fault zone and the Rio Puerco highlands. The eastern boundary of the basin is defined by a complex fault system and the Manzano-Sandia Mountains chain. The highland and mountainous areas have been formed by unfaulted blocks while the basin has been formed by the accumulation of sediments on the graben floor. Sediment thickness varies from a few feet adjacent to the Sandias to 21,000 feet near the Rio Grande. Grant (1981) postulates that maximum stratigraphic displacement is on the order of 31,000 feet, based upon deep exploratory well data and the elevation of Sandia Peak. Indicative of the complex nature of the local geology are numerous structural benches and steps within the basin, depicted on Figure 3.7.

Grant (1981) has identified four major fault systems existing within the limits of Kirtland Air Force Base (Figure 3.8). The Tijeras Fault and the Hubbell Springs Fault intersect on the base and are considered to be active at the present time. The Hubbell Springs Fault is

FIGURE 3.5

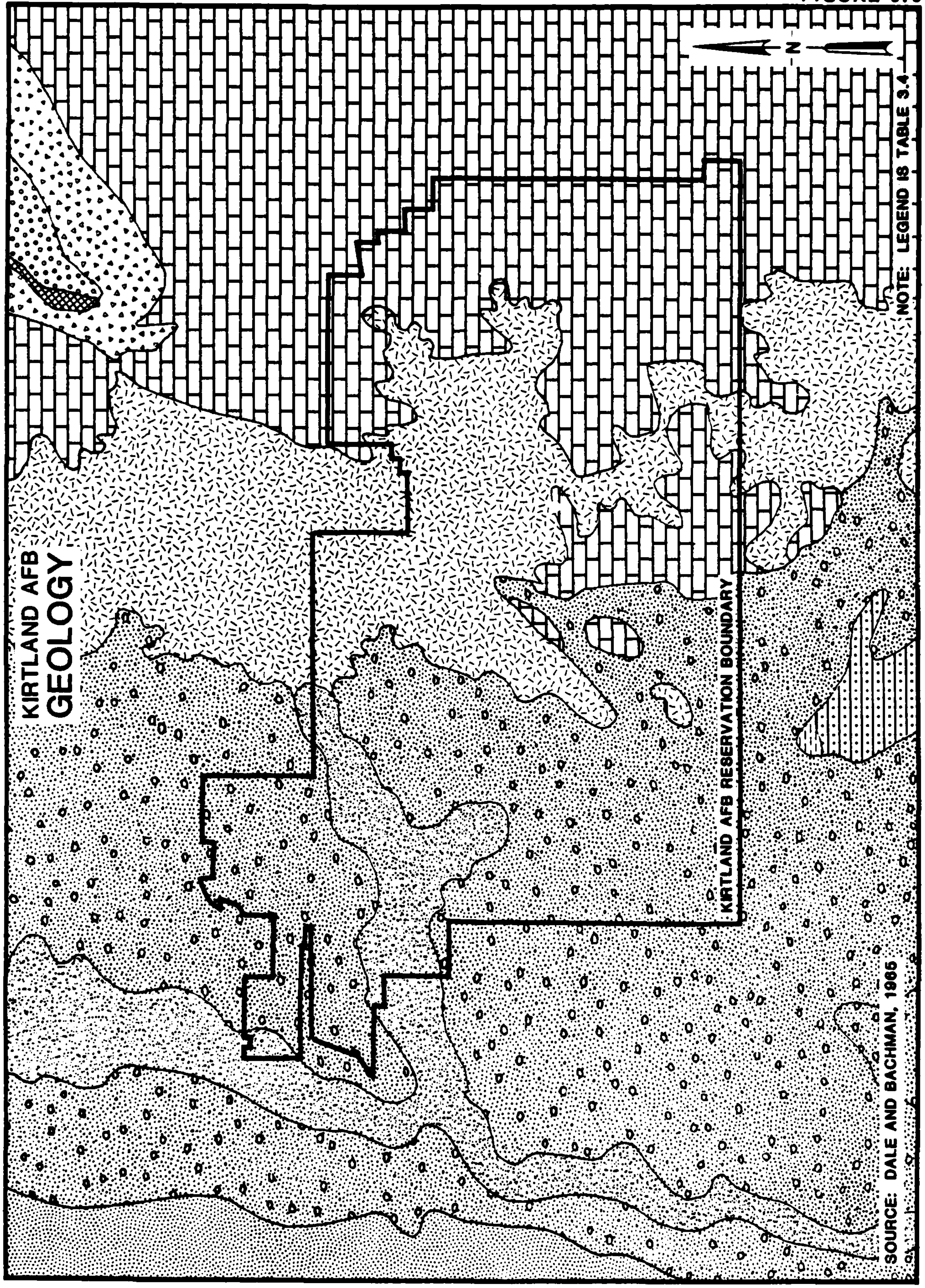
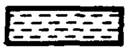

KIRTLAND AFB
GEOLOGY
N
NOTE: LEGEND IS TABLE 3.4
KIRTLAND AFB RESERVATION BOUNDARY
SOURCE: DALE AND BACHMAN, 1965

TABLE 3.4

LEGEND

KIRTLAND AFB GEOLOGY

(See Figure 3.5)

SYMBOL	DESCRIPTION	
	Quaternary:	alluvial sands and gravels
	Quaternary:	terrace and pediment sands, gravels, caliche
	Quaternary:	upper Sante Fe Group sediments
	Cretaceous:	consolidated sedimentary rocks, undivided
	Triassic:	consolidated sedimentary rocks, undivided
	Permian:	consolidated sedimentary rocks, undivided
	Permian:	Abo sandstone
	Permian:	Yeso Formation sandstone
	Pennsylvanian:	Madera Limestone and Sandia Formation
	Pre-Cambrian:	consolidated rocks, undivided

SOURCE: Dale and Bachman, 1965

TABLE 3.5

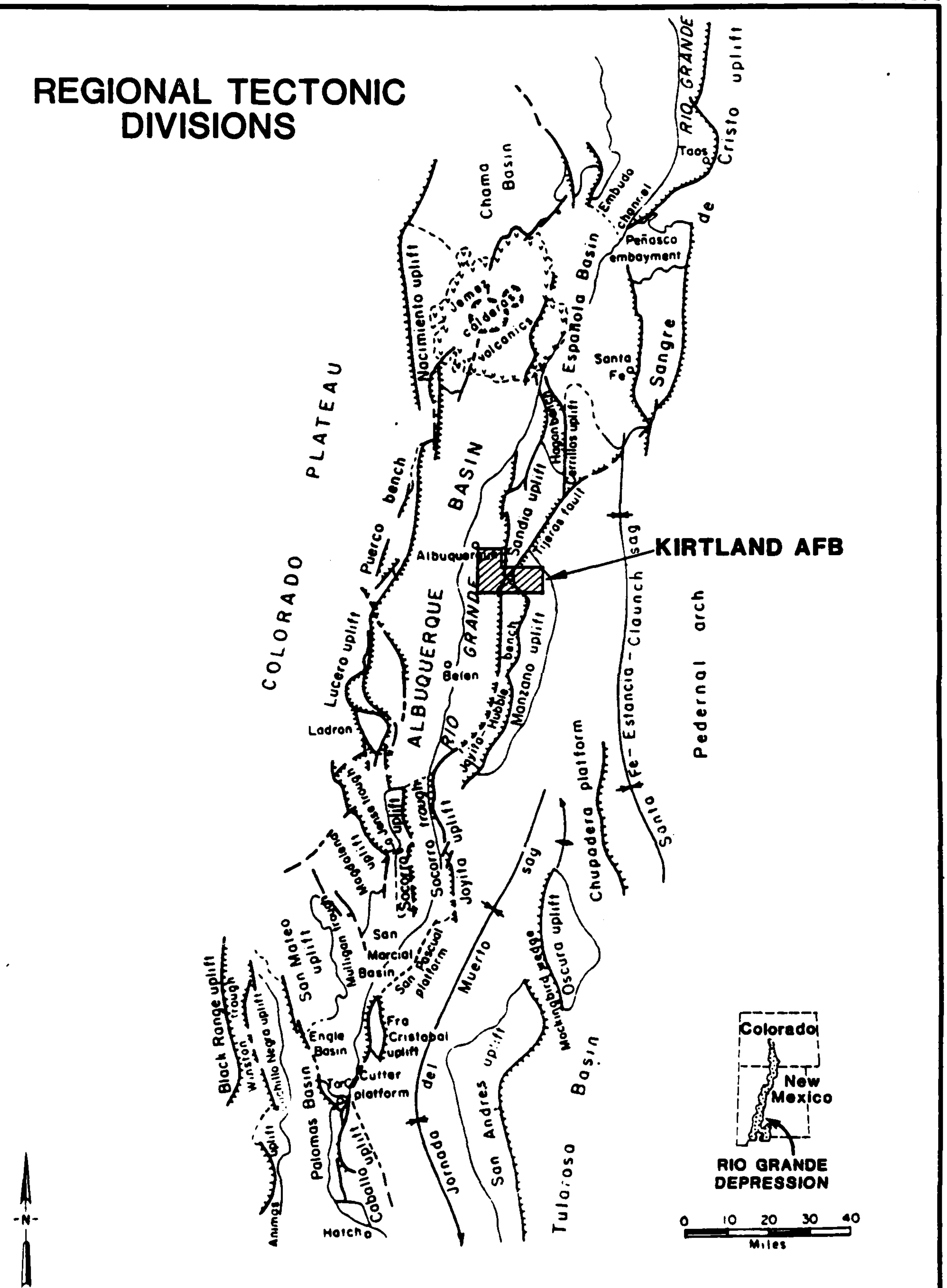
MECHANICAL ANALYSIS OF SOILS FROM THE KIRTLAND AFB AREA

MATERIAL PIT SUMMARY:

PIT OR PROSPECT NO.		56-56-S	60-2-S
Location	Part of Sec.	Sandia Pueblo Grant	NW 1/4
	Section	" " "	4
	Twnshp. & Range	" " "	T 9 N. R 3 E
	County	Bernalillo	Bernalillo
	State	New Mexico	New Mexico
Geologic Age		Quaternary	Quaternary
Formation		Terrace	Alluvium
Type of Pit		Gravel	Sand
Kind of Material		Quartzite & various	Quartzite & various
Quality of Material		Excellent	Fair
Thickness of Material		20+ feet	15- feet
Thickness of cap (Caliche)		-	-
Blasting Qualities		-	-
Uniformity		Excellent	Fair
Impurities		None	None
Type of Mat'l Underlying Formation		Sandstone, siltstone, & clay	Siltstone & sandstone
Moisture Condition		Dry	Dry
Depth of Overburden		0.0 - 9.0 feet	None
P. I. (Overburden)		N.P.	N.P.
Est. Quantity Remaining		50,000 cu. yds.	100,000 cu. yds.
L. A. Wear		24.4	27.2
Maximum Size		8"	2"
% Retained on 2" Sieve		Less than 35	0
Pit Average % Passing	Crushed to	-	-
	2"	73	100
	1"	61	98
	3/4"	57	97
	1/2"	51	77
	#4	12	56
	#10	36	45
	#200	5	5
P. I.		N.P.	N.P.

SOURCE: New Mexico State Highway Department Interstate Route 40 Corridor Study

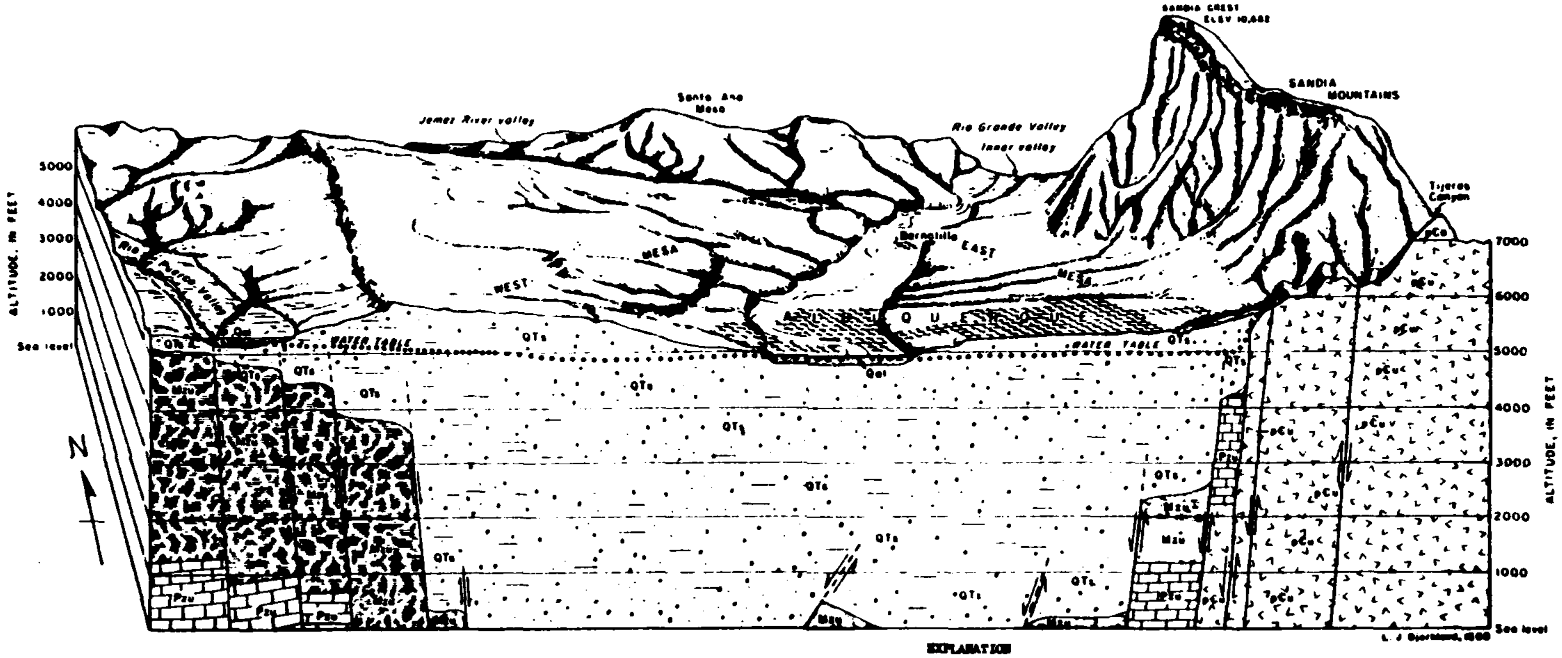
REGIONAL TECTONIC DIVISIONS

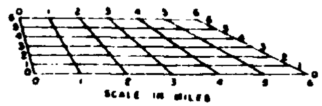


SOURCE: GRANT, 1981

FIGURE 3.7

STRUCTURAL BLOCK DIAGRAM OF ALBUQUERQUE AREA





EXPLANATION

Recent — Qal — Alluvium. Mostly unconsolidated gravel, sand, silt, and clay. Yields large quantities of water to wells. — **QUATERNARY**

Middle(?) Miocene to Pleistocene(?) — QTs — Santa Fe group. Mostly unconsolidated to loosely consolidated gravel, sand, silt, and clay, with some interbedded volcanic rocks. Includes bajada deposits of Recent age. Yields large quantities of water to wells — **TERTIARY and QUATERNARY**

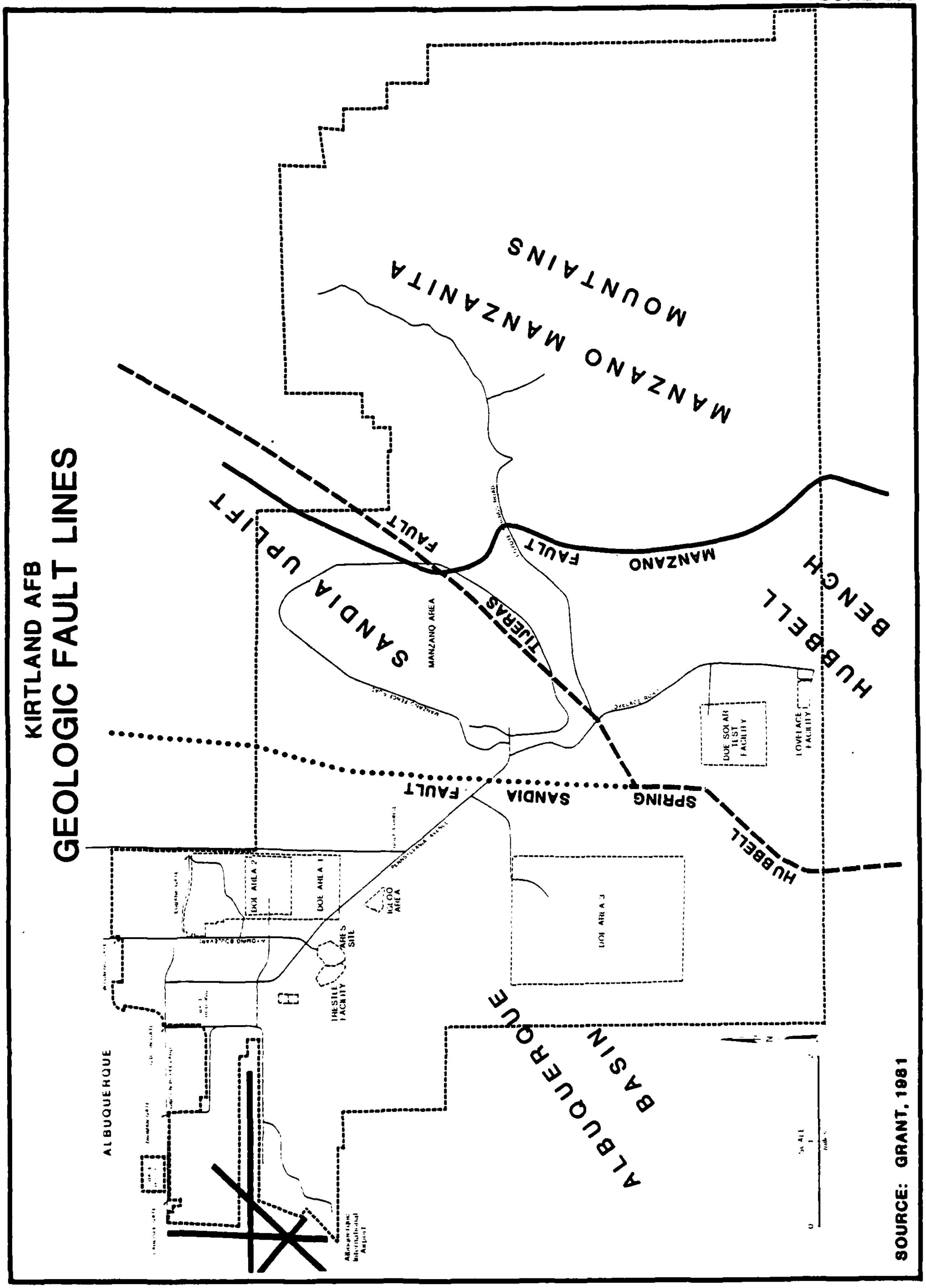
Mzu — Sedimentary rocks, undivided. Mostly shale and sandstone. Yield small quantities of water to wells — **MESOZOIC**

Pzu — Sedimentary rocks, undivided. Mostly limestone, sandstone, and shale. Yield small quantities of water to wells — **PALEOZOIC**

pCu — Granitic and metamorphic rocks, undivided. Yield small quantities of water to wells — **PRECAMBRIAN**

SOURCE: BJORKLUND AND MAXWELL, 1961

FIGURE 3.8


KIRTLAND AFB
GEOLOGIC FAULT LINES
MANZANO MANZANITA MOUNTAINS
TIJERAS FAULT
SANDIA UPLIFT
MANZANO FAULT
HUBBELL BENCH
SANDIA FAULT
HUBBELL SPRING
ALBUQUERQUE BASIN
MANZANO AREA
DOE AREA 1
DOE AREA 2
DOE AREA 3
IGLOO AREA
ARES SITE
TRESTLE FACILITY
DOE SOLAR TEST FACILITY
LOVELACE FACILITY
ALBUQUERQUE
SOURCE: GRANT, 1981

significant due to its control over ground-water movement. Titus (1963) has reported in a Valencia County study that east of the fault, depths to ground water are generally less than 100 feet. Springs, indicative of surface or near-surface water levels, have been observed along the fault alignment. West of the Hubbell Springs Fault, depths to ground water abruptly extend to 400 to 500 feet. Water levels measured in base wells at buildings B 29055 and 29056 indicate ground water at an approximate depth of 54 feet below ground surface. This suggests that either the shallow-water condition controlled by the Hubbell Springs Fault exists on Kirtland Air Force Base in similar fashion to those conditions described in the Valencia County Study or that a locally perched ground water condition exists where the aforementioned wells are located. Additional information is required to confirm the shallow ground water situation east of the fault and to determine its extent. The remaining geologic fractures are the Manzano and Sandia Faults. The Manzano Fault is believed to be the significant structural fracture responsible for raising the Manzanita and Manzano Mountains to their present position of topographic prominence. The Sandia Fault may be a northward extension of the Hubbell Springs Fault and is suspected of being the point where the massive, east tilting Sandia Mountains separated from rocks underlying the Rio Grande Rift (Grant, 1981). The influence of these faults over ground-water movement in the Kirtland Air Force Base area is not well understood at this time. Grant (1981) has postulated that travertine deposition (a massive, non-crystalline variety of calcite, formed by the precipitation of calcium carbonate from solution in ground water) within fault fractures on installation lands may have significantly reduced permeabilities to the point where faults presently act as near vertical barriers to the westward migration of ground water.

The Rio Grande Rift region is known to be tectonically active, due to recent earthquake and volcanic events. Available records indicate that over 1,100 earthquakes have occurred during a 127-year period of record (Grant, 1981). Many of the recorded earthquakes have occurred in the 75-mile zone between Socorro and Albuquerque. According to statistic evidence, a non-damaging earthquake may be expected every three years in the Socorro-Albuquerque area, while a damaging event may be expected once every 100 years.

HYDROLOGY

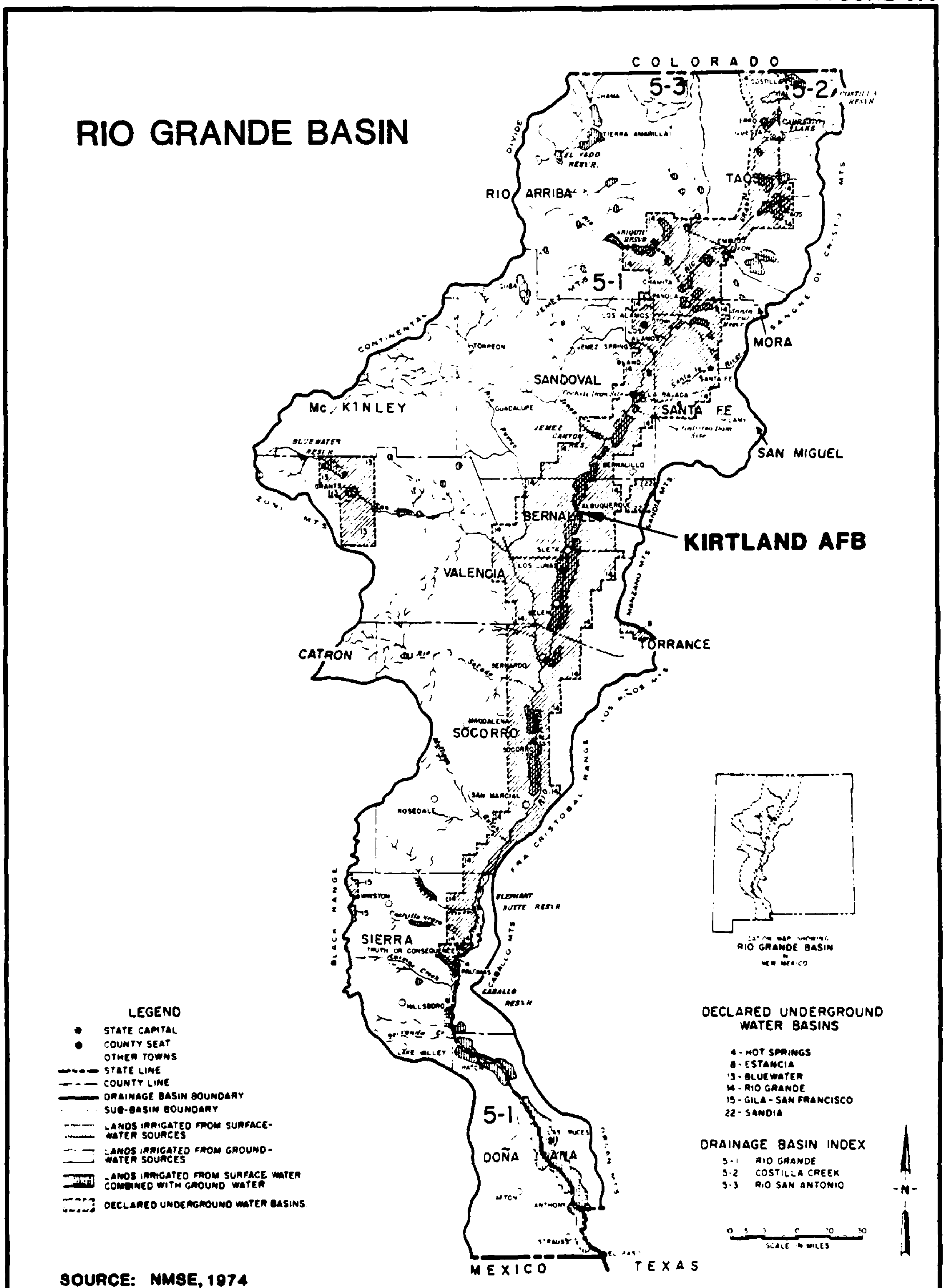
Ground-water hydrology of the Albuquerque-Kirtland Air Force Base area has been reported by Bjorklund and Maxwell (1961), Titus (1963), Reeder, Bjorklund and Dinwiddie (1967), New Mexico State Engineer (1967 and 1974), West and Broadhurst (1975) and by the Albuquerque District, U.S. Army Corps of Engineers, et al. (1979). Additional information has been obtained from a report prepared for Sandia National Laboratories by Grant (1981).

Kirtland Air Force Base lies within the limits of the Rio Grande underground water basin, a natural resource area defined by the State of New Mexico as a "declared underground water basin" (Figure 3.9), regulated as a sole source of potable water. The Rio Grande Basin operates as a complex system whose major functional components are identified on Figure 3.10. The relationships of these functional components are depicted in Figure 3.11.

The principal aquifer of the Rio Grande Basin and Kirtland Air Force Base has been termed the "valley fill." The valley fill is comprised of unconsolidated and semi-consolidated sands, gravels, silts and clays of the *Pliocene Santa Fe Formation*, alluvial fan deposits associated with upland area erosion and valley alluvium, associated with stream development. The valley fill varies in thickness from a few feet adjacent to the mountain ranges of Kirtland East to over 21,000 feet at a point five miles southwest of the airfield. The valley fill has definite limits, bounded to the west and east by the upfaulted block mountains, and a distinct lower limit, formed by the consolidated rocks of the graben floor. The aquifer "ends" are considered to be open in the Albuquerque area as the valley fill in the study area contains ground water along the entire extent of the Rio Grande (Figure 3.12).

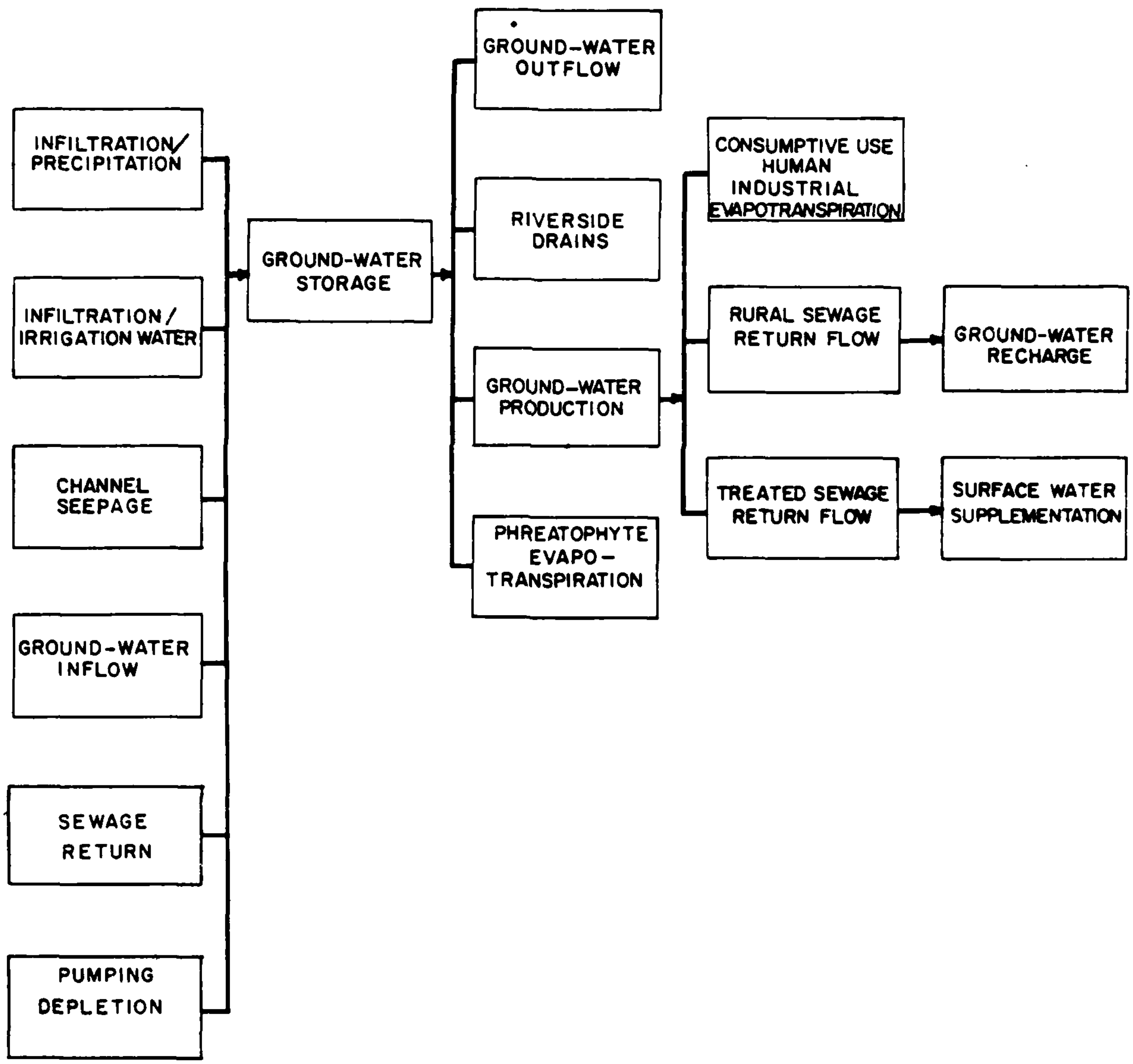
Ground water exists in the valley fill under water table (unconfined) conditions, although locally, artesian (confined) conditions may exist. In almost all areas underlain by thick accumulations of the valley fill, ground water may be obtained in large quantities. In areas where the fill thins, such as at the base of mountains, supplies may be limited. The water table of the Albuquerque area is known to be an irregular, sloping surface. Irregularities in this surface are thought to be due to changes in local permeability, variations in saturated

FIGURE 3.9



SOURCE: NMSE, 1974

GROUND-WATER SYSTEM COMPONENTS

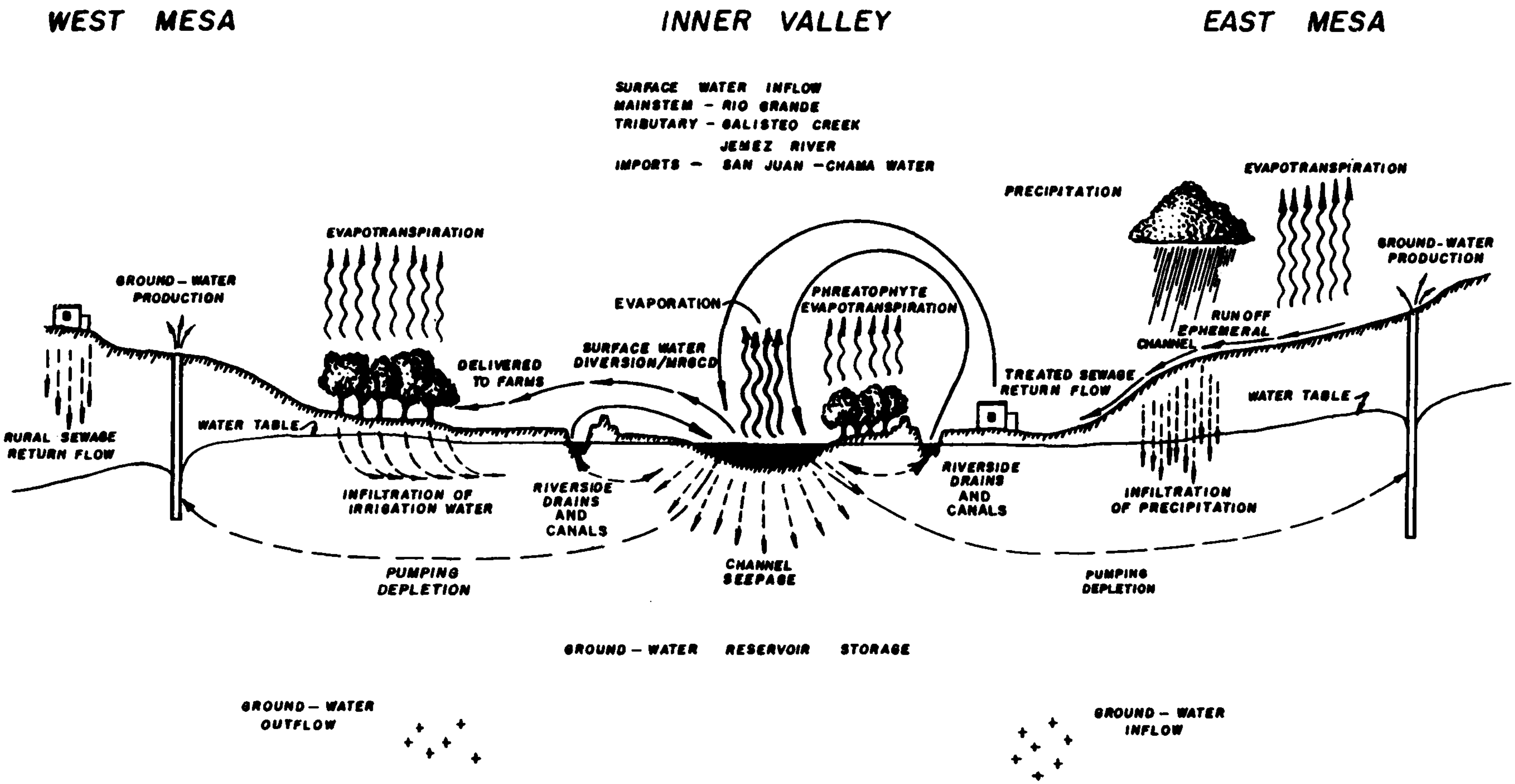


SOURCE: COE, 1979

FIGURE 3.11

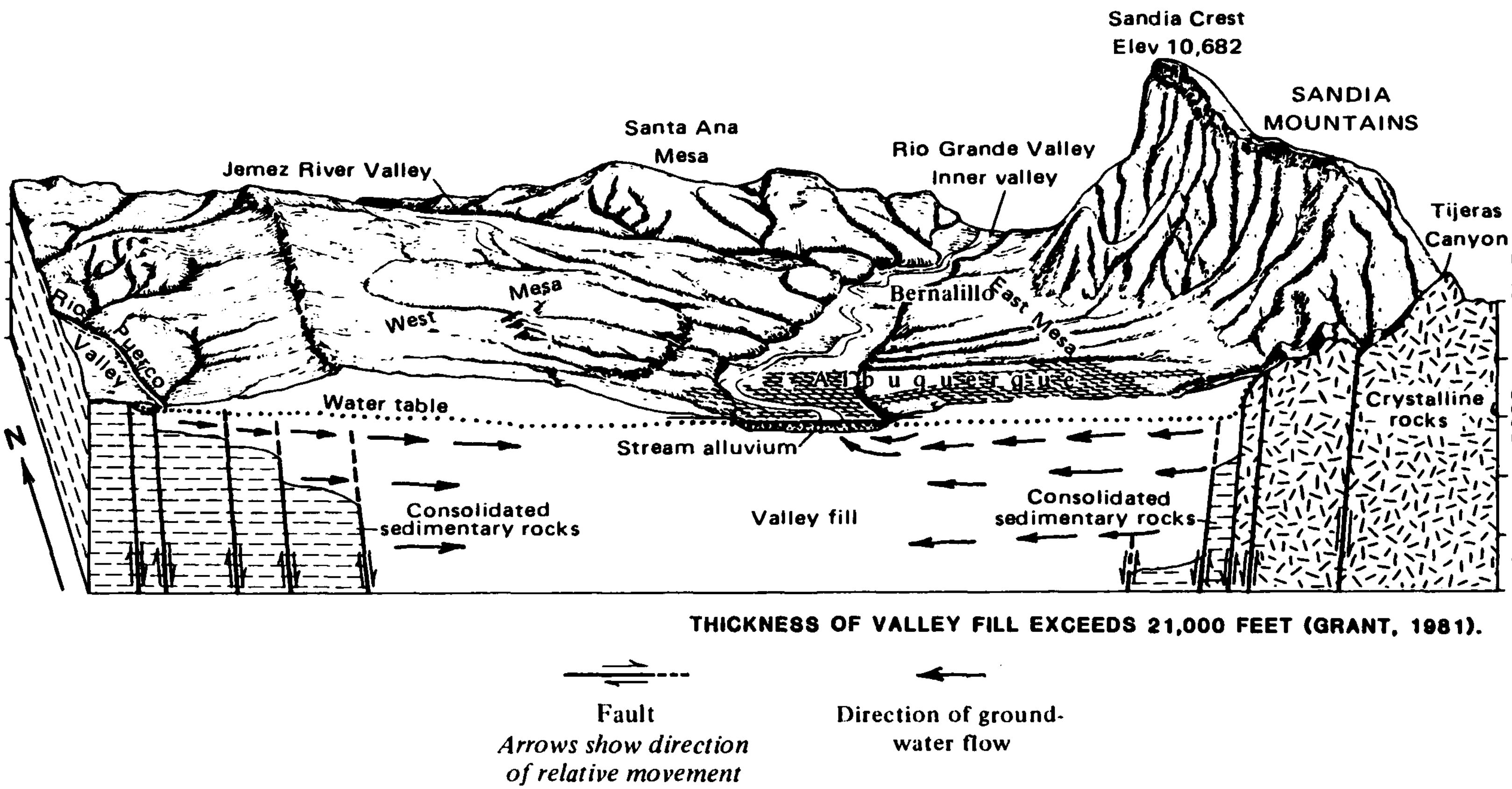
KIRTLAND AFB

AREA HYDROLOGIC SYSTEM



SOURCE: COE, 1979

BLOCK DIAGRAM OF AREA HYDROLOGIC SYSTEM



THICKNESS OF VALLEY FILL EXCEEDS 21,000 FEET (GRANT, 1981).

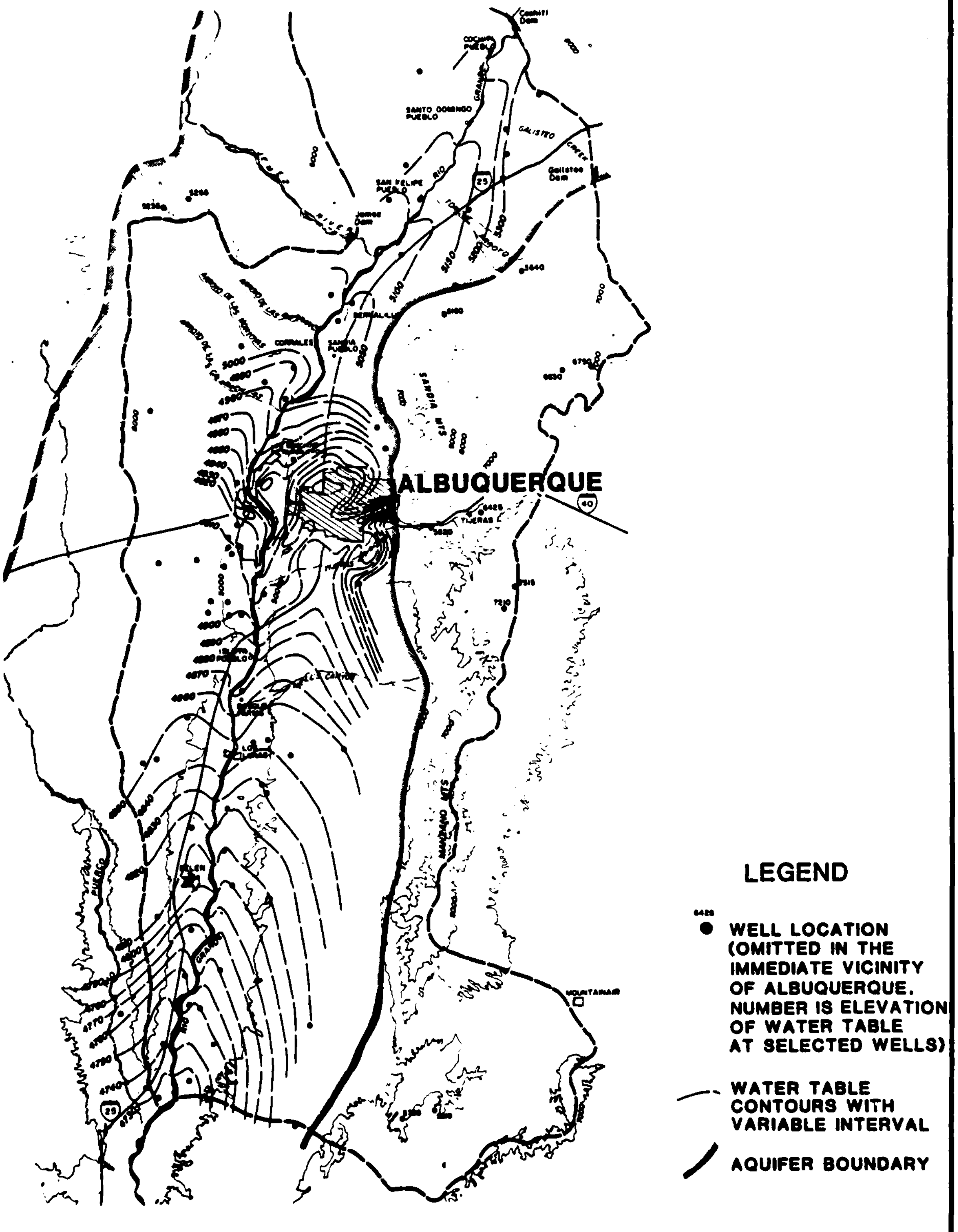
SOURCE: WEST AND BROADHURST, 1975

thickness and local additions or withdrawals of ground water. The impact of local faulting on Kirtland AFB ground-water flow is not known, however well data suggests that the area east of the Hubbell Springs Fault may have significantly shallower ground-water levels than that portion of the installation west of the fault. Generally, the regional water table slopes at a shallow gradient diagonally downvalley from the upland bases in a southwestward direction moving to the Rio Grande (Figure 3.13). Water levels within the valley fill fluctuate with use or addition to the hydrogeologic system. Water level fluctuations may be brief, seasonal or long term within the study area. Recharge to the system occurs from precipitation, underflow of ground water from adjacent areas, and seepage from streams, canals, drains, surface reservoirs and applied crop irrigation water. On Kirtland Air Force Base, recharge is most likely to occur at the base of mountains where coarse-grained deposits of pediment materials favor the rapid inflow of precipitation.

In the City of Albuquerque, the rapid withdrawal of ground water from concentrated areas (well fields) has modified the geometry of the water table surface and has locally altered ground-water flow directions. Figure 3.14 depicts city well fields presently in existence. In order to permit aquifer recovery in areas where water level drawdowns have reached significant proportions, the city reportedly has ceased pumpage in 1979 from the Main Plant and Candelaria well fields and has curtailed production from the Love and Lomas well fields. Ground-water conditions at Kirtland Air Force Base may be impacted, however, in the event that the adjacent Ridgecrest well field creates a major drawdown. At this time it is not possible to predict what effects such impacts will have on Kirtland ground-water supplies. Figure 3.15 depicts the configuration of the Albuquerque area water table as of 1978. It must be noted that the excessive drawdown effects evident at the Lomas and Love well fields are presently being ameliorated by curtailment of pumpage from these fields (Scott, 1981).

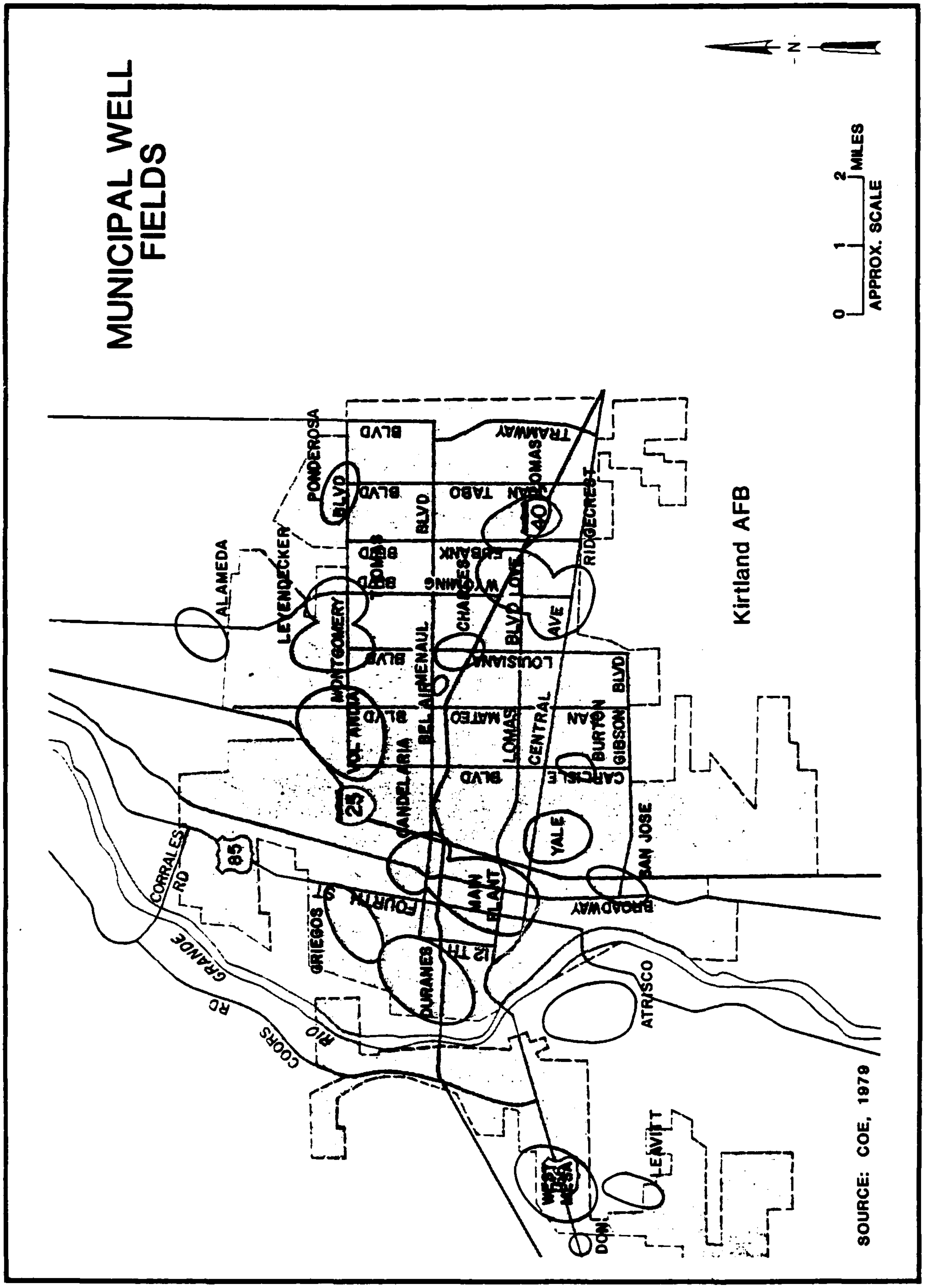
Kirtland Air Force Base presently obtains water supplies from a system of twelve wells screened into valley fill deposits and by purchasing additional supplies from the City of Albuquerque. Installation wells have been constructed individually and are not installed in well fields as are the city wells. The locations of Kirtland AFB supply

REGIONAL GROUND-WATER TABLE CONFIGURATION



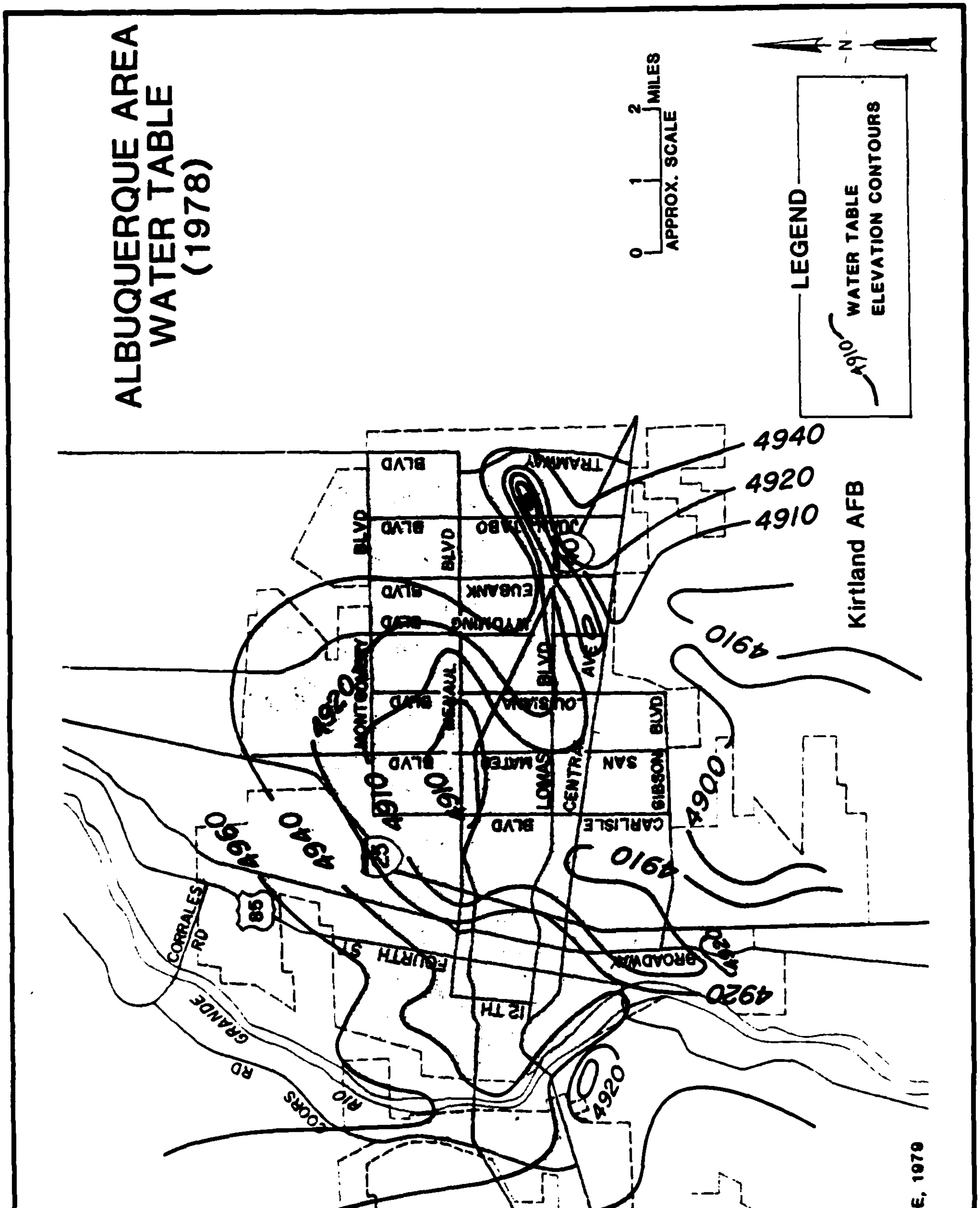
SOURCE: COE, 1979

FIGURE 3.14



MUNICIPAL WELL FIELDS
N
0
1
2
MILES
APPROX. SCALE
Kirtland AFB
TRAMWAY
BLVD
PONDEROSA
JUAN TABO
LOMAS
40
RIDGECREST
ALAMEDA
LEVENDECKER
MONTGOMERY
EUBANK
TOMAS
WYOMING
CHARLES
MENAUL
LOUISIANA
LOVE
AVE
BEL AIR
VOL ANDIA
CANDELARIA
SAN MATEO
LOMAS
CENTRAL
BURTON
GIBSON
CARLISLE
25
YALE
SAN JOSE
85
CORRALES RD
FOURTH ST
MAIN PLANT
BROADWAY
GRIEGOS
DURANES
12 TH
ATRISCO
RIO GRANDE
COORS RD
LEAVITT
WEST MESA
DONI
SOURCE: COE, 1979

FIGURE 3.15



ALBUQUERQUE AREA
WATER TABLE
(1978)
0 1 2 MILES
APPROX. SCALE
N
LEGEND
4910
WATER TABLE
ELEVATION CONTOURS
Kirtland AFB
4940
4920
4910
4900
4960
TRAMWAY
JUAN TABO
EUBANK
WYOMING
MONTGOMERY
MENAUL
LOUISIANA
SAN MATEO
SAN PEDRO
LOMAS
CENTRAL
GIBSON
CARLISLE
BROADWAY
FOURTH ST
12 TH
CORRALES RD
COORS RD
RIO GRANDE
BLVD
AVE
25
85
66
SOURCE: COE, 1979

wells are shown on Figure 3.16. Base wells now in service average 1000 feet to finished depth. Static water levels recorded in base wells vary from 403 feet below ground surface at well number 13 to 580 feet at well number 11. Base well construction data are summarized in Table 3.6 and base well logs data are presented in Appendix C. The quality of water derived from base wells is generally good and complies with drinking water standards.

ENVIRONMENTALLY SENSITIVE CONDITIONS

The environmental setting data evaluated for this study indicate the following key items concerning disposal of waste materials on the base:

- The primary regional aquifer, the valley fill, underlies Kirtland Air Force Base at great depth (400 to 600 feet) west of the Hubbell Springs Fault and apparently at Shallow depth east of the fault (54 feet).
- Kirtland AFB obtains water supplies from municipal sources and from its own well system. The Kirtland well system is comprised of individual wells distributed over the western half of the installation, in contrast to the municipal well system which is composed of wells concentrated in well fields.
- Valley fill unconsolidated sediments are very permeable and are exposed over large areas at ground surface. The valley fill is present in very thick sequences.
- Area precipitation rates are low, potential evapotranspiration rates are substantially higher.
- There are neither threatened and endangered species not wetland areas present on the base (Appendix C).

From these major points it may be seen that west of the Hubbell Springs Fault the potential for the generation and mobilization of contamination caused by past waste disposal practices is slight. Even if mobilized, such contamination would probably not penetrate the thick sequences of the unsaturated zone of the valley fill (400-600 feet) to reach the deep water table below. Only very large volumes of liquid waste could be reasonably expected to penetrate to such depths to reach the ground-water system. The distribution of Kirtland AFB wells over a

FIGURE 3.16

KIRTLAND AFB
WELL LOCATIONS

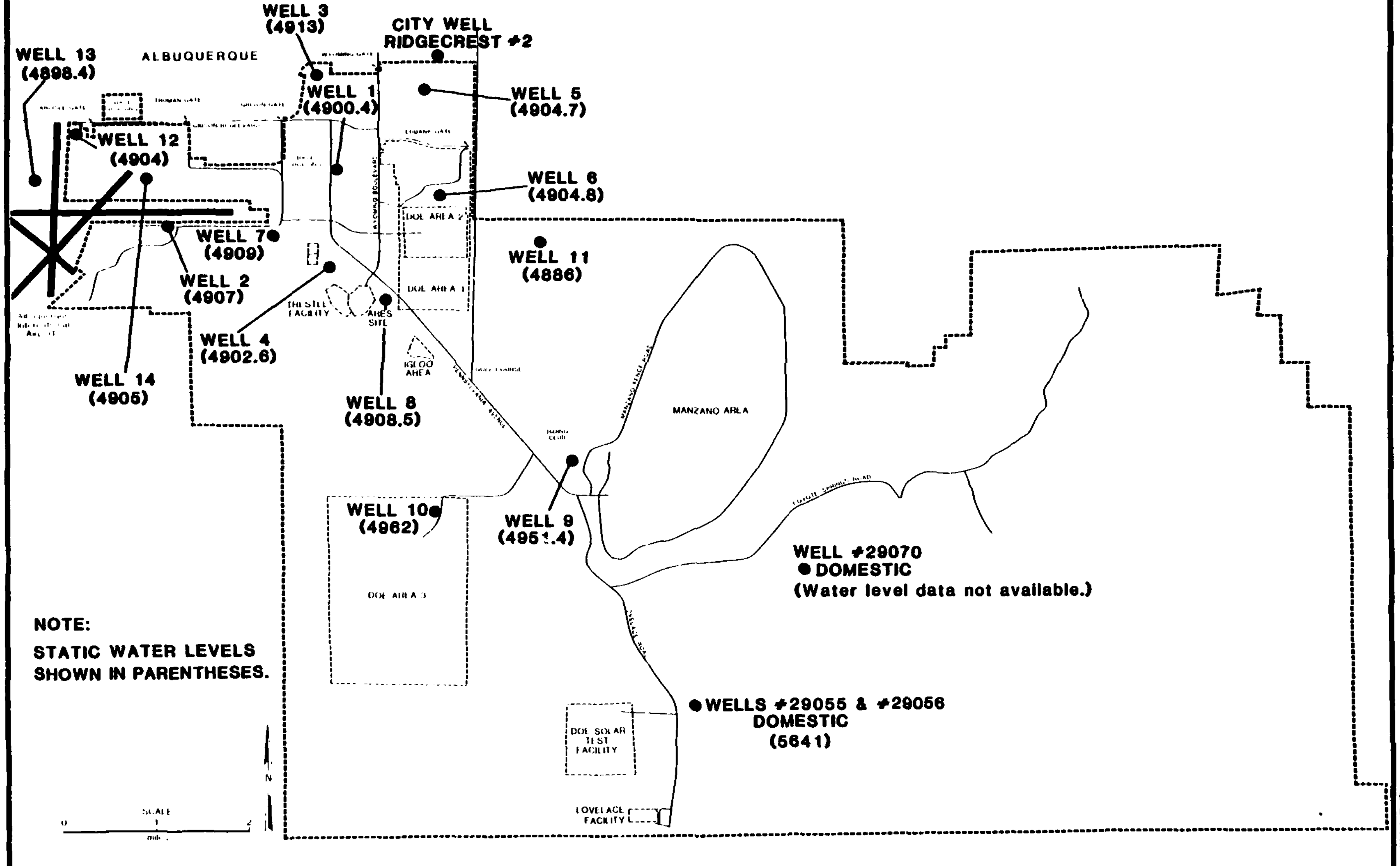


TABLE 3.6
SUMMARY OF KIRTLAND AFB WELLS
SOURCE: BASE CIVIL ENGINEER

BLDG. NO.	WELL NO.	CASING SIZE	DEPTH TO WATER, FEET	EXISTING CAPACITY GPM	TOTAL HEAD	MOTOR H.P.	PUMP TYPE	DATE DRILLED	REMARKS
20374	1 KE	12"	1199	625	520'	100	Submersible	1949	(2)
26025	2 KE	14"	1000	700	470'	125	Submersible	1949	(9)
23900	3 KE	14"	900	650	520'	125	Submersible	1949	(3)
20550	4 KE	14"	1000	700	470'	125	Submersible	1949	(4)
22999	5 KE	14"	1004	Pumping equipment removed 1975				1952	(1)
20725	6 KE	14"	1006	600	570'	150	Line Shaft	1952	(1), (8)
26039	7 KE	16"	1000	1200	560'	300	Line Shaft	1955	(11)
20798	8 KE	16"	1000	700	626'	200	Line Shaft	1955	(7)
30151	9 MN	8"	650	Manzano Area abandoned 1970				1949	
06585	10 DOE	12"	1050	200	650'	100	Submersible	1959	(6)
28030	11 KE	16"	1327	1900	780'	500	Line Shaft	1972	(5)
00890	12 KW	16"	1030	750	470'	200	Line Shaft	1952	(4) (10)
00169	13 KW	16"	1000	900	490'	200	Line Shaft	1956	
01014	14 KW	16"	1000	1200	625'	300	Line Shaft	1969	
29070	Data not available. Well not in service.								
29055	-	3"	150	-	54'	Well not in service.			
29056	-	3"	150	-	54'	Well not in service.			

Remarks: Pump equipment has been lowered in wells where declining water levels have been observed.

(1) Bowls lowered 40 feet 1958
(2) Bowls lowered 60 feet 1974
(3) Bowls lowered 40 feet 1975
(4) Bowls lowered 40 feet 1976
(5) Bowls lowered 60 feet 1976
(6) Well in Area III owned and operated by DOE.
(7) Installed casing liner 99 feet of 14" blank and 267 feet of 12" SLOTTED 1976
(8) Bowls lowered 40 feet 1979
(9) Bowls lowered 30 feet 1980
(10) Installed casing liner, 70 ft 14" blank and 511 feet of 12" slotted; bowls lowered 20', 1979
(11) Bowls lowered 25' in 1973

SOURCE: Kirtland AFB records

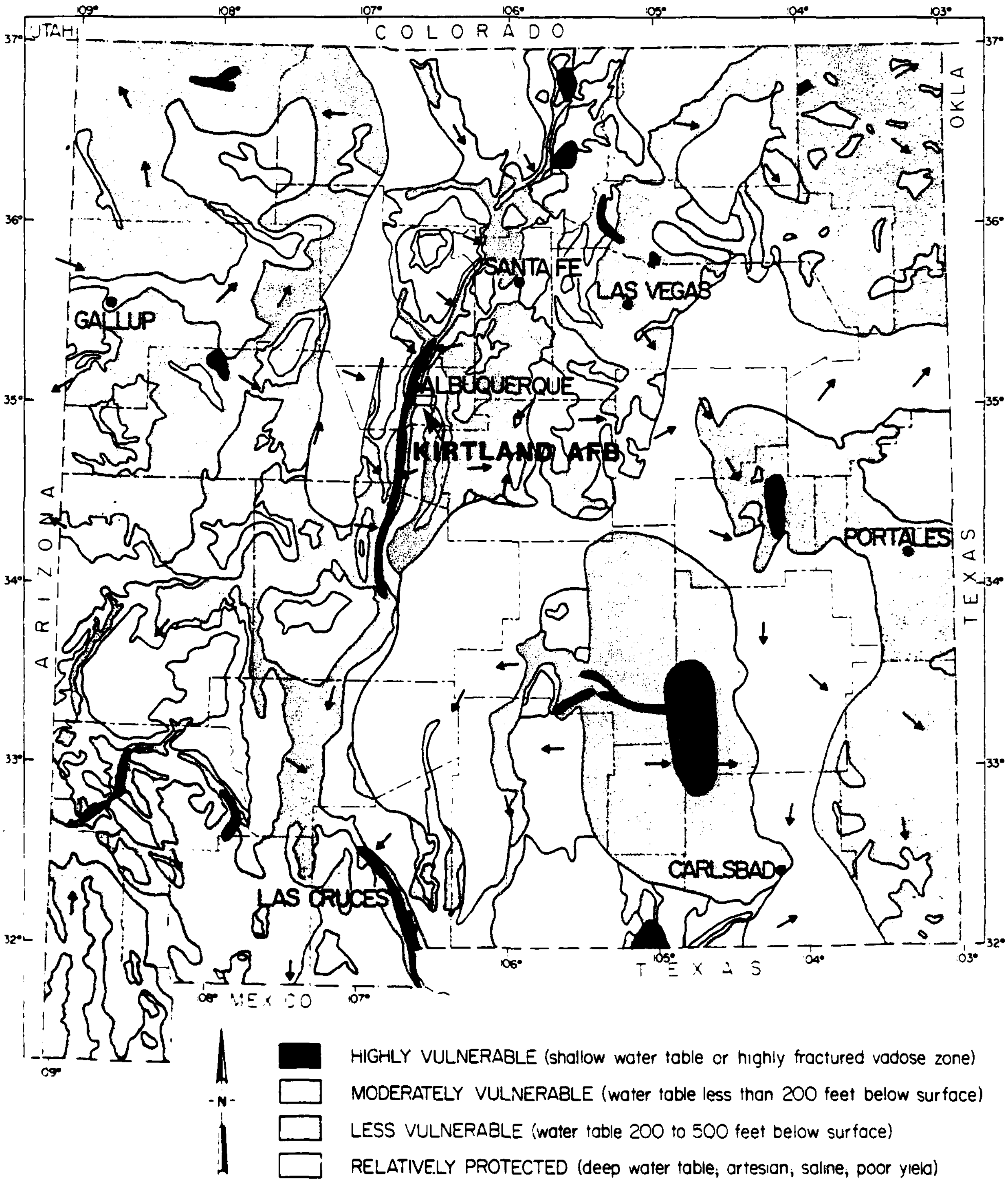
relatively large area further serves to protect area water supplies by preventing the development of a significant local drawdown which would encourage contaminant movement, should such contaminants reach the saturated zone. Wilson (1981) mapped New Mexico's major aquifers relative to their potential vulnerability to contamination from surface pollutant sources (Figure 3.17). This map shows Kirtland Air Force Base stradding two mapping units "Less vulnerable (water table 200 to 500 feet below surface)" and "Relatively protected (deep water table, artesian, saline, poor yield)." Base well data shows that water levels are typically on the order of 400-600 feet below ground surface. It is concluded therefore that deep, serviceable aquifers are relatively protected from surface contamination sources. Two base wells have indicated shallow water levels (54 feet) in an area east of the Hubbell Springs Fault and may or may not represent the northward extention of a large-scale condition identified in Valencia County by Titus (1963). Without benefit of further data, it must be concluded that the potential for contamination of ground water on base is possible at this location due to the presence of relatively permeable valley fill materials overlying what appears to be a shallow water table aquifer. Additional data is required both to confirm this condition and to determine its extent.

State of New Mexico EID test data indicates that two city wells (SJ3 and SJ6) located in the city's San Jose well field west of the installation, have become contaminated with industrial chemicals (Figure 3.18). In addition, a privately owned industrial process well (AVW) located just south of the San Jose well field has also been contaminated by organic materials including industrial chemicals and solvents. According to Thomas (1981) this may be due to a combination of factors including a relatively high water table locally, (which does not typically exist on Kirtland AFB) highly permeable soils of the unsaturated zone, high-volume municipal well field pumpage and liquid industrial waste disposal by area industries. Kirtland Air Force Base and its appurtenant activities are not believed to be associated in any way with the previously discussed incidents of well contamination. (Thomas, 1981).

FIGURE 3.17

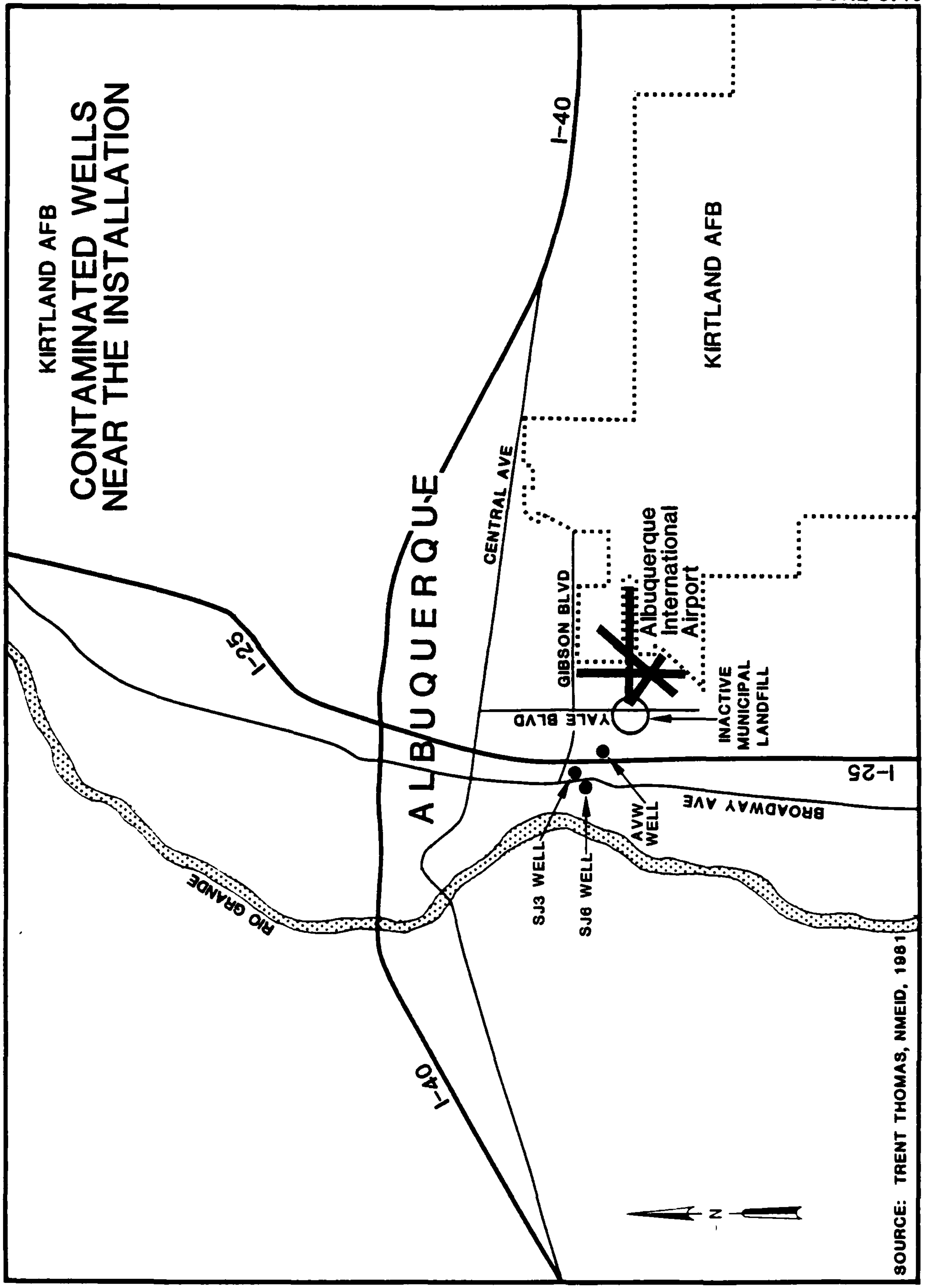
NEW MEXICO AQUIFERS

RELATIVE VULNERABILITY TO CONTAMINATION FROM SURFACE DISCHARGES



SOURCE: WELLS, LAMBERT AND CALLENDER, 1981

FIGURE 3.18


KIRTLAND AFB
CONTAMINATED WELLS
NEAR THE INSTALLATION
KIRTLAND AFB
I-40
I-40
I-25
I-25
ALBUQUERQUE
CENTRAL AVE
GIBSON BLVD
YALE BLVD
BROADWAY AVE
Albuquerque
International
Airport
INACTIVE
MUNICIPAL
LANDFILL
AVW
WELL
SJ3 WELL
SJ6 WELL
RIO GRANDE
N
SOURCE: TRENT THOMAS, NMEID, 1981

SECTION 4

FINDINGS

SECTION 4

FINDINGS

To assess hazardous waste management at Kirtland Air Force Base, past activities of waste generation and disposal methods were reviewed. This section summarizes the hazardous waste generated by activity, describes waste disposal methods, and identifies and evaluates the disposal sites located on the base. Figure 4.1 presents the decision- tree methodology used in the review of waste practices. This methodology provides a logical algorithm for the consistent evaluation of all base practices.

PAST SHOP, LABORATORY AND BASE ACTIVITY REVIEW

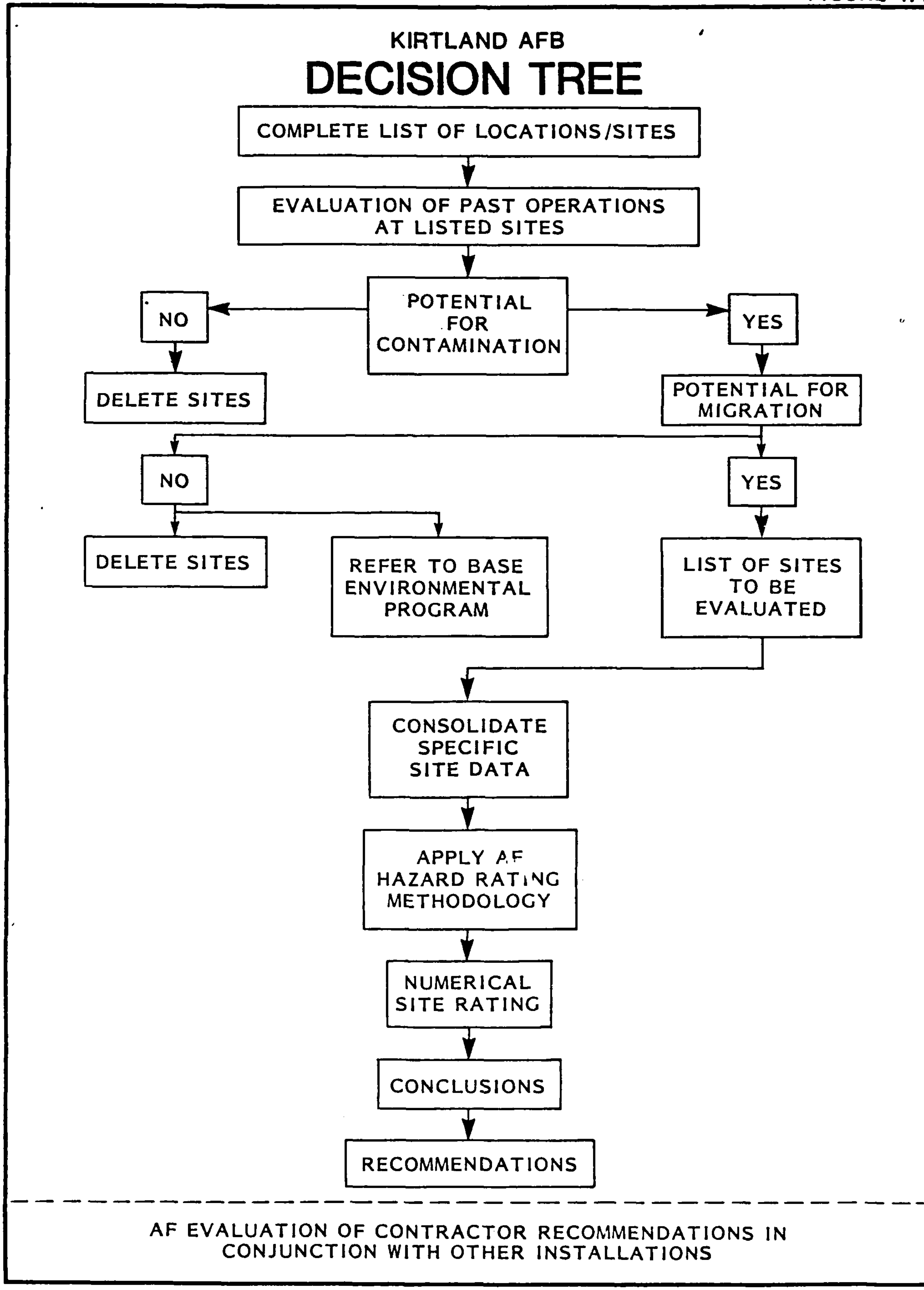
To determine past base activities that resulted in generation and disposal of hazardous waste, a review was conducted of current and past waste generation and disposal methods. This review consisted of interviews with base employees, a search of files and records, and site inspections.

All hazardous waste that is generated on Kirtland AFB can be associated with one of the following activities:

- Industrial shops
- Research and development laboratories
- Pesticide and herbicide utilization
- Radioactive training facilities
- Fire control training
- Fuel management
- Sandia Laboratory
- Lovelace Laboratory
- General Electric facility

The following discussion addresses only those wastes generated on base which are either hazardous or potentially hazardous. In this discussion a hazardous waste is defined as hazardous by either the Resource

FIGURE 4.1


KIRTLAND AFB
DECISION TREE
COMPLETE LIST OF LOCATIONS/SITES
EVALUATION OF PAST OPERATIONS AT LISTED SITES
POTENTIAL FOR CONTAMINATION
NO
YES
DELETE SITES
POTENTIAL FOR MIGRATION
NO
YES
DELETE SITES
REFER TO BASE ENVIRONMENTAL PROGRAM
LIST OF SITES TO BE EVALUATED
CONSOLIDATE SPECIFIC SITE DATA
APPLY AF HAZARD RATING METHODOLOGY
NUMERICAL SITE RATING
CONCLUSIONS
RECOMMENDATIONS
AF EVALUATION OF CONTRACTOR RECOMMENDATIONS IN CONJUNCTION WITH OTHER INSTALLATIONS

Conservation and Recovery Act (RCRA), or the Kirtland documents which have been reviewed. A potentially hazardous waste is one which is suspected of being RCRA hazardous although insufficient data are available to fully characterize the waste material.

Industrial Shops

Major mission support activities are conducted at Kirtland AFB by various groups and squadrons through industrial shops. These shops fabricate, maintain and repair components and parts for aircraft and ground equipment. A list of industrial shops was obtained from the Bioenvironmental Engineering Office and served as a starting point for the review of past waste generation and hazardous materials disposal practices. Present and past building locations and service dates were obtained from the office files. Also, hazardous material uses and hazardous disposal methods were obtained from these files for industrial shops. A summary of shops is presented in Appendix D. Also, facility descriptions for each shop are presented in Appendix E.

Those shops which may pose a potential for ground-water or surface water contamination were then selected for further review and investigation. A shop was considered to pose a potential for contamination if hazardous materials were handled, hazardous wastes were generated, or the quantity of hazardous waste was significant to pose problems if improperly handled. Also, any indication of non-standard hazardous waste disposal practices were reviewed.

Approximately 26 shops were selected for on-site interviews. An additional 26 shops were selected for follow-up telephone interviews following the team site survey. Information obtained from these interviews included hazardous waste compounds, waste quantities and disposal methods for each shop. Also, data were obtained in order to construct a hazardous waste disposal method timeline for each major waste compound. The results of the detailed shop review are listed in Table 4.1. However, several shops which may generate hazardous waste are eliminated from Table 4.1 due to the slight degree of hazard expected from their wastes. The table indicates the shop building location, the hazardous material utilized, the waste quantities and the disposal methods on a

TABLE 4.1

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS 1950 1960 1970 1980
1550 FMS				
AEROSPACE-GROUND EQUIPMENT (AGE) REPAIR	381	PD-680	150 GALS./MO.	DRUMMED TO DPDO
		ENGINE OILS	160 GALS./MO.	DRUMMED TO DPDO
		ENGINE FUELS	100 GALS./MO.	DRUMMED TO DPDO
		HYDRAULIC FLUIDS	55 GALS./MO.	DRUMMED TO DPDO
PNEUDRAULICS SHOP	1002	PD 680	20 GALS./MO.	DRUMMED TO DPDO
TIRE SHOP	1002	PAINT STRIPPERS	20 GALS./MO.	DRUMMED TO DPDO
		PD-680	15 GALS./MO.	DRUMMED TO DPDO
CORROSION-CONTROL SHOP	482	PAINT THINNERS	20 GALS./MO.	DRUMMED TO DPDO
		PD-680 SLUDGE	20 GALS./MO.	PUMP OUT TO DPDO
		PAINT STRIPPERS SLUDGE	15 GALS./MO.	PUMP OUT TO DPDO
		SHOP WASH WATER	75 to 100 GALS./MO.	SAND TRAP TO DRAIN FIELD
GUN SERVICES SHOP	1017	PD 680	25 GALS./MO.	DRUMMED TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

TABLE 4.1 (Cont'd)

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS (1950 1960 1970 1980)
1550 FMS (Cont'd)				
PAINT SHOP	1001	PAINT BOOTH WATER WASTES	720 GALS./4 MOS.	DISCHARGE TO STORM DRAIN
		THINNERS	10 GALS./MO.	DRUMMED TO FIRE TRAINING
WELDING SHOP	1001	PERCHLOROETHYLENE	50 GALS./YR.	TO SANDIA LAB; DPDO
PLATING AND ANODIZING	1001	HYDROCHLORIC ACID	2 GALS./MO.	STORM DRAIN; TO SANDIA LAB; DPDO
		PLATING SOLUTIONS	30 GALS./YR.	TO STORM DRAIN
		SULFURIC ACID	350 GALS./2 YRS.	DILUTED TO STORM DRAIN
PROPULSION BRANCH	336	PD 680	35 GALS./MO.	DRUMMED TO DPDO
		ENGINE OIL	30 GALS./MO.	DRUMMED TO DPDO
		CARBON REMOVER	10 GALS./MO.	DRUMMED TO DPDO
		SHOP WASH WATER	60 70 GALS./MO.	GREASE TRAP TO STORM SEWER
PROPULSION BEARING MAINTENANCE	336	PD 680	5 GALS./MO.	DRUMMED TO DPDO
		CARBON REMOVER	1 GAL./MO.	DRUMMED TO DPDO
JET ENGINE TEST CELL	702	WASTE FUELS	4 GALS./MO.	WASH DOWN TO DRAINAGE DITCH
		ENGINE OILS	10 GALS./MO.	DRUMMED TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

TABLE 4.1 (Cont'd)

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS 1950 1960 1970 1980
1550 OMS				
H 3/H 53 PHASE DOCK	1000	PD-680	5 GALS./MO.	TO STORM SEWER
		ENGINE OILS	20 GALS./MO.	U.G. TANK TO DPDO
		WASTE FUELS	30 GALS./MO.	U.G. TANK TO DPDO
		HYDRAULIC FLUIDS	10 GALS./MO.	U.G. TANK TO DPDO
AGE NON-POWER SHOP	1016	PD-680	15 GALS./MO.	U.G. TANK TO DPDO
C 130 MAINTENANCE SHOP	1009	PD-680	5 GALS./MO.	TO STORM SEWER
		ENGINE OILS	30 GALS./MO.	U.G. TANK TO DPDO
		WASTE FUELS	30 GALS./MO.	U.G. TANK TO DPDO
		HYDRAULIC FLUIDS	15 GALS./MO.	U.G. TANK TO DPDO
1606 CES				
PAINT SHOP	20681	PAINT BOOTH WATER WASTES	300 GALS./6 MOS.	SANITARY SEWER

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

TABLE 4.1 (Cont'd)

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS (1950 1960 1970 1980)
1606 CES (Cont'd)				
PAINT SHOP	20681	THINNERS	10 GALS./MO.	ROCK BED AT SHOP
FUEL MAINTENANCE	20687	STORAGE TANK SLUDGE	450 GALS./CLEAN-OUT	STORAGE TANK CLEAN-OUT OCCURS ON AN "AS NEEDED" BASIS. A CONTRACTOR CLEANS THE TANKS AND DISPOSES OF THE SLUDGE.
ENTOMOLOGY SHOP	20684	PESTICIDE RINSE WATER	200 GALS./MO.	TO FRENCH DRAIN
		RINSED CANS	2 LBS./MO.	TO LANDFILL
		BANNED PESTICIDES	5 GALS.	BANNED PESTICIDES WERE DISPOSED ONE TIME AT THE SANDIA LAB FACILITY.
POWER PRODUCTION	20681	BATTERY ACIDS	2 GALS./MO.	DILUTION THEN SANT. SEWER
		PD-680	10 GALS./YR.	DRUMMED TO DPDO
		WASTE OILS	200 GALS./YR.	DRUMMED TO DPDO
		WASTE FUELS	50 GALS./YR.	DRUMMED TO DPDO
1606 TRANS				
MINOR MAINTENANCE	20341	WASTE OIL	500 GALS./MO.	DRUMMED TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

TABLE 4.1 (Cont'd)

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS (1950 1960 1970 1980)
1606 TRANS (Cont'd)				
REFUELING MAINTENANCE	377	WASTE OIL	15 GALS./MO.	DRUMMED TO DPDO
		WASTE FUELS	10 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
		PD-680	2 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
WHEEL AND TIRE SHOP	23348	WASHRACK SLUDGE WASTE	20 GALS./MO.	PUMP OUT TO DPDO
HEAVY EQUIPMENT MAINTENANCE	20423	ENGINE OIL	500 GALS./MO.	DRUMMED TO DPDO
		PD-680	100 GALS./YR.	DRUMMED TO DPDO
BATTERY SHOP	20423	WASTE ACID SOLUTIONS	150 GALS./MO.	LIMESTONE NEUTRAL PIT TO SANT. SEWER
MANZANO MAINTENANCE	30142	WASTE OILS	100 GALS./ 4 MOS.	DRUMMED TO DPDO
		OIL FILTERS	2 LBS./MO.	DRAINED THEN TO LANDFILL
		PD-680	20 GALS./6 MOS.	DRUMMED TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

TABLE 4.1 (Cont'd)

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS (1950 1960 1970 1980)
NEW MEXICO AIR NATIONAL GUARD (ANG)				
PNEUDRAULICS SHOP	1043	PD-680	25 GALS./2 MOS.	WASHRACK TO O/W SEPARATOR TO SANT. SEWER
		HYDRAULIC FLUIDS	35 GALS./MO.	DRUMMED TO CONTRACTOR
		TRICHLOROETHYLENE	25 GALS./MO.	PUMP OUT TO DPDO
JET-ENGINE TEST CELL	1031	WASTE FUELS	10 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
		PD-680	3 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
		WASTE OILS	1 GAL./MO.	O/W SEPARATOR TO SANT. SEWER
WEAPONS SHOP	1043	PD-680	20 GALS./MO.	WASHRACK TO O/W SEPARATOR TO SANT. SEWER
AGE AND TIRE SHOP	1051	PD 680	220 GALS./6 MOS.	FIRE TRAINING; WASHRACK THEN DRUMMED TO DPDO
		PAINT STRIPPERS	1 GAL./MO.	FIRE TRAINING; DRUMMED TO DPDO
VEHICLE MAINTENANCE	1058	ENGINE OILS	150 GALS./MO.	DRUMMED TO DPDO
		WASTE FUELS	220 GALS./MO.	DRUMMED TO DPDO

KEY

——————— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

TABLE 4.1 (Cont'd)

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS 1950 1960 1970 1980
ANG (Cont'd)				
CORROSION CONTROL	1046	WASTE FUELS	100 GALS./MO.	DRUMMED TO DPDO
		WASTE OILS	125 GALS./MO.	DRUMMED TO DPDO
		PD 680	700 GALS./6 WKS.	DRUMMED TO DPDO
		PAINT STRIPPERS	4 GALS./MO.	DRUMMED TO DPDO
NAVAL WEAPONS EVALUATION FACILITY (NWEF)				
GROUND SUPPORT EQUIPMENT	1002	ENGINE OILS	110 GALS./MO.	DRUMMED TO DPDO
		WASTE FUELS	110 GALS./MO.	DRUMMED TO DPDO
		HYDRAULIC FLUIDS	20 GALS./MO.	DRUMMED TO DPDO
		PD-680	30 GALS./MO.	DRUMMED TO DPDO
ARMAMENT SHOP	1002	PD-680	1 GAL./MO.	DRUMMED TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

TABLE 4.1 (Cont'd)

INDUSTRIAL OPERATIONS (Shops)

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS (1950 1960 1970 1980)
NWEF (Cont'd)				
LINE DIVISION	1002	PD-680	55 GALS./MO.	WASHRACK TO O/W SEPARATOR TO STORM SEWER
		WASTE FUELS	110 GALS./MO.	DRUMMED TO DPDO
AIR-FRAME SHOP	1002	WASTE OIL	15 GALS./MO.	DRUMMED TO DPDO
		HYDRAULIC FLUIDS	10 GALS./MO.	DRUMMED TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

timeline. The solid line indicates time frame data confirmed by shop personnel, and the dotted line indicates time frame data which is assumed by the shop personnel.

Shop personnel reported their past disposal activities included containerizing waste oils and fuels for contractor pickup, utilizing oil/water separators with sludge collection by base civil engineering, and use of the storm drains for disposal of certain untreated wastes. Also, certain shop facilities utilize treatment methods including limestone pits for battery/acid treatment, a french drain, and a rock bed for paint disposal. The most common materials disposed of from the base shops include PD-680, other solvents, waste oils and waste fuels.

Research and Development Laboratories

The Air Force Weapons Laboratories (AFWL) perform a major weapons research and development function at Kirtland Air Force Base, including experiments involving laser development. Nonresearch laboratories include photo labs and non-destructive inspection labs associated with aircraft maintenance. A master list of the laboratory facilities is contained in Appendix D. Also, facility descriptions for the laboratories are listed in Appendix E.

The labs that utilize hazardous materials, generate hazardous waste and dispose hazardous waste in significant quantities may have a potential for contamination of ground water or surface water and were investigated. Contamination potential was based on quantities of waste generated by the lab and individual disposal methods shown in the Bioenvironmental Engineering Office files. Table 4.2 lists these labs, indicating the laboratory location, the hazardous material used, the hazardous waste quantity disposed and the disposal method with a timeline.

A small amount of radioactive material is generated on KAFB in addition to that produced by Sandia National Labs, Lovelace Inhalation Toxicology Research Institute, and the Interservice Weapons School. Less than 30 pounds of low level radioactive waste are generated per year at the Thorium Lab (Building 400) during the coating of optical material, and additional low level radioactive waste is generated at the base hospital. Radioactive waste from these sources is placed in double-plastic bags inside 50-gallon drums. The drums are stored in a locked, marked building on base until a number of drums have accumu-

TABLE 4.2

RESEARCH & DEVELOPMENT LABORATORIES

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS (1950 1960 1970 1980)
AIR FORCE WEAPONS LAB (AFWL)				
NTPY*/ADVANC D-CONCEPTS BRANCH	613/614	RADIOACTIVE WASTE	< 1 LB./YR.	SANDIA LAB RADIATION DUMP
		SOLVENTS, RAGS	< 1 LB./MO.	REFUSE TRASH
		OILS	5 GALS./YR.	ON-SITE STORAGE
ARAC*/CHEMICAL-LASER BRANCH	617	HF/DF** SCRUBBER SOLUTION	400 GALS./MO.	SCRUBBER TO LIMESTONE PIT TO DRAIN FIELD
		WASTE OILS	25 GALS./MO.	DRUMMED TO DPDO
		HYDROGEN PEROXIDE SOLUTION	500 LBS./3 MOS.	DRAIN FIELD; DILUTION POND TO DRAIN FIELD
		LABORATORY CHEMICALS	10 LBS./MO.	EOD DISPOSAL
NTMF*/FACILITIES OPERATIONS BRANCH	20560	OILS, FLUIDS, ALCOHOLS	UNKNOWN	DRUMMED TO ON-SITE STORAGE
NTMF*/FACILITIES OPERATIONS BRANCH	20797	WASTE OILS	10 GALS./MO.	DRUMMED TO ON SITE STORAGE
ARLO*/OPTICAL SYSTEMS BRANCH	30136	TRICHLOROETHANE	50 GALS./MO.	DRUMMED TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

* Office Symbols

** Hydrogen Flouride/Deuterium Flouride

TABLE 4.2 (Cont'd)

RESEARCH & DEVELOPMENT LABORATORIES

HAZARDOUS WASTE GENERATION

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	TREATMENT, STORAGE AND DISPOSAL METHODS 1950 1960 1970 1980
MISCELLANEOUS BASE LABS				
1550th NON-DESTRUCTIVE INSPECTION LAB	482	DEVELOPER	50 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
		FIXER	50 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
		EMULSIFIER	50 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
		PENETRANT	3 GALS./MO.	O/W SEPARATOR TO SANT. SEWER
		DEVELOPER FLUOR	110 GALS./6 MOS.	O/W SEPARATOR TO SANT. SEWER
ANG PHOTO LAB	1055	DEVELOPER	1 GAL./MO.	SANITARY SEWER
		FIXER	5 GALS./ 6 MOS.	SANITARY SEWER SILVER RECOVERY
NWEF PHOTO LAB	1002	DEVELOPER	10 GALS./MO.	SANITARY SEWER
		FIXER	10 GALS./MO.	SANITARY SEWER SILVER RECOVERY
		ACETIC ACID	2 GALS./MO.	SANITARY SEWER
		COLOR CHEMICALS	12 GALS./MO.	SANITARY SEWER

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ASSUMED TIME FRAME DATA BY SHOP PERSONNEL

lated, then they are shipped to one of three permitted burial sites located outside the base or turned over to a corporation licensed to handle radioctive materials. A small amount of radioactive material from the laser lab is disposed of in the active radioactive landfill located in DOE Technical Area III.

Pesticide and Herbicide Utilization

The KAFB pesticide/herbicide/rodent program was begun in 1952 with two shops: one for the east side and one for the west side. The present shop is located in Building 20687 The shop's function is to control weeds and insects on the base, treating some areas on a regular basis while others are sprayed as needed. Both large truck-mounted sprayers and hand-held sprayers are utilized. A variety of pest and weed control chemicals are used throughout the year.

At present, off-spec and unused pesticides and herbicides are sent to DPDO. Before 1980 these waste materials were disposed of in the DOE chemical waste landfill, or sent to Kelly AFB for disposal. The shop personnel know of no incidence where these chemicals have been disposed of in the KAFB general refuse landfills. A partial list of pesticides and herbicides used at Kirtland AFB is presented in Appendix C.

The large truck-mounted spray equipment is rinsed out after use and the wash water is allowed to run out onto the ground. This is done either at the spraying site or in an area next to the railroad tracks near the shop.

The small hand-held sprayers are rinsed in a sink located at the pesticide/herbicide shop. The rinse water goes to a buried gravel-filled trench where it is allowed to infiltrate. Shop personnel estimate that about 10 gpd of contaminated rinse water is discharged to the trench. Prior to construction of the trench in 1972, the wash water was discharged to the ground surface near the shop.

About every 2 to 3 months the pesticide/herbicide shop must dispose of chemical containers. The containers are rinsed in the shop sink and the wash water is discharged to the trench. The containers are disposed of at the Kirtland AFB landfill in a special trench. This method of container disposal has been practiced since about 1957.

The wash water disposal procedures utilized by the pesticide/herbicide shop have the potential for contaminating the ground with toxic

chemicals. The degree of contamination and ground water quality effects, if any, are presently unknown.

Radioactive Training Facilities

A total of eight nuclear accident training sites are maintained on Kirtland AFB for the purpose of training military personnel in alpha radiation monitoring and decontamination of simulated nuclear weapon accidents. These sites were established in November 1963. The training is done through the Interservice Nuclear Weapons School (INWS), which is administered by the 3416th Technical Training Squadron under Special Order G-81, Headquarters Air Training Command.

The eight nuclear accident training sites are shown on Figure 4.2. Each site is fenced and marked with radiation warning signs. Training areas are patrolled by the Security Police to deter unauthorized entrance.

Brazilian Thorium Hydroxide Sludge is used to seed the training areas. The sludge is produced during the chemical removal of thorium-232 from Brazilian monazite ore. Thorium hydroxide and rare earth oxides are the principal components of the sludge, as shown in Table 4.3. After purchase, the sludge is stored in drums at training site TS-6 until use.

To simulate a nuclear accident, the drum contents are spread on the ground with a fertilizer spreader or shovel in a pattern resembling plutonium spread from a nuclear weapons accident. The material is allowed to dry, and is raked into the top 1/4" or so of topsoil to blend with the surrounding area. The resulting contaminated areas cover 1000 to 15,000 square feet (at each site), and simulate alpha contamination. A sealed cobalt-60 source is also used at the training sites to simulate gamma radiation.

The amount of sludge used for seeding each site is not known; however, between 1963 and 1971 a total of 15,270 pounds of sludge was used at the eight sites. Immediately after seeding, alpha radiation levels of approximately 70,000 counts per minute (cpm) may be detected on an alpha radiation survey meter. The training sites are seeded at approximately yearly intervals to maintain high alpha readings for

FIGURE 4.2

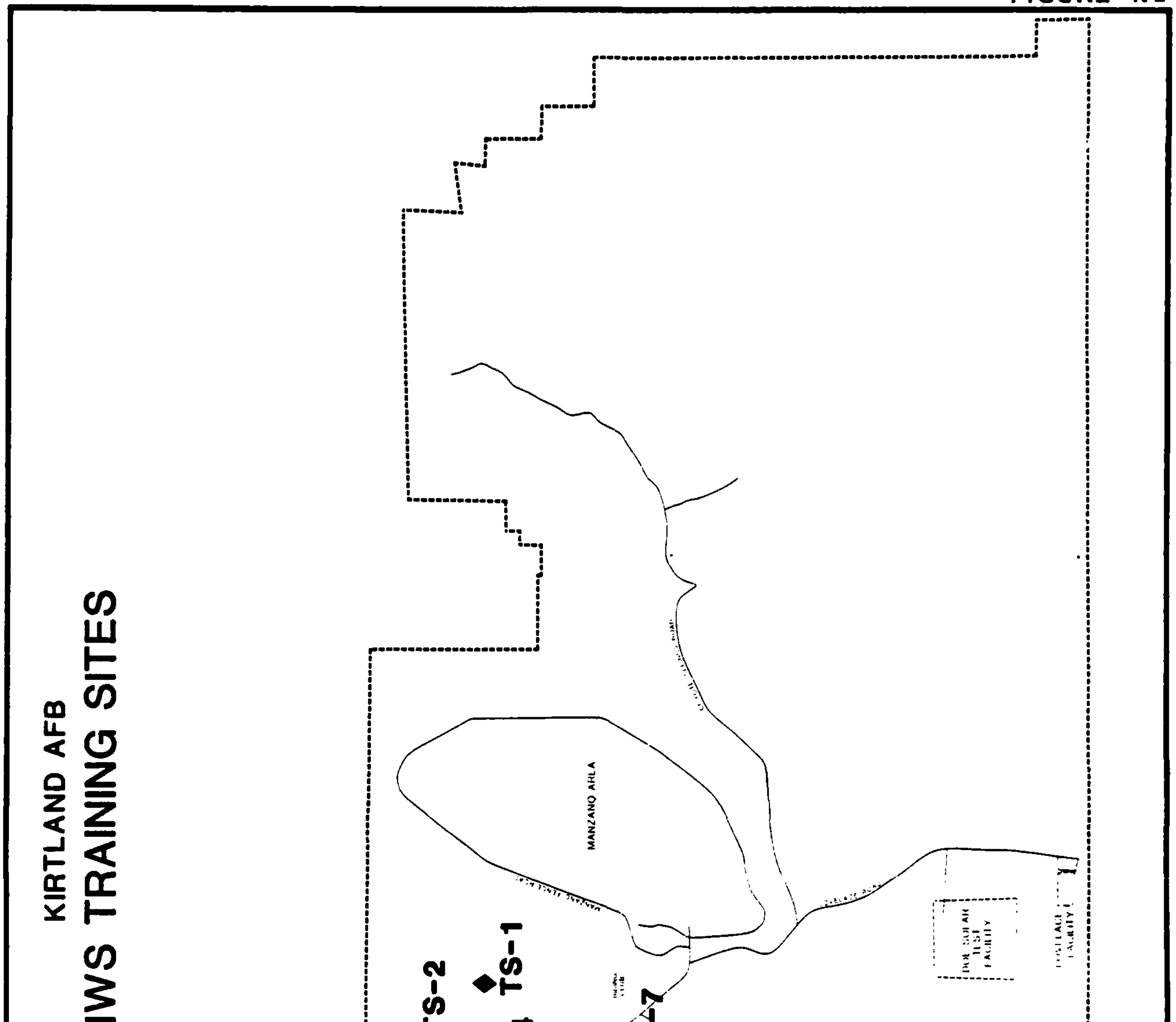

KIRTLAND AFB
INWS TRAINING SITES
TS-1
TS-2
TS-3
TS-4
TS-5
TS-6
TS-7
TS-8
MANZANO AREA
ALBUQUERQUE
DOE AREA 1
DOE AREA 2
DOE AREA 3
IGLOO AREA
ARES SITE
TRESTLE FACILITY
SOURCE: KIRTLAND AFB DOCUMENTS

TABLE 4.3

ANALYSIS OF BRAZILIAN MONAZITE SLUDGE ON DRY BASIS

Component	Per Cent	Component	Per Cent
ThO_2 (Thorium Oxide)	45	ZrO_2 (Zirconium Dioxide)	1.4
$(RE)_2O_3$ (Rare Earth (Oxides)	15	P_2O_5 (Phosphous Pentoxide)	5.3
SiO_2 (Silicon Dioxide)	4.4	U_3O_3 (Uranium Oxide)	1.0
TiO_2 (Titanium Dioxide)	7.0	Cl (Chlorine)	2.6
Fe_2O_3 (Ferrous Oxides)	4.3	Ignition Loss	14

$(RE)_2O_3$ represents total rare earth oxides.

training purposes. Tests during the last five to seven years indicate that 30 to 45 percent of the thorium remains at the training sites after a one-year period. The rest is gradually lost as fugitive emissions, runoff, or infiltration. However, routine air monitoring during training exercises has not indicated any significant fugitive emissions of the thorium from a health standpoint. Although radiological monitoring of storm runoff has not been done, radiological surveys of nearby watercourses and KAFB have indicated no concentrations of radioactive materials due to water deposition. Infiltration of thorium sludge into the top layer of soil is suspected, but not documented. Most of the thorium is expected to infiltrate to a depth of less than a foot. Infiltration studies of plutonium, an element similar to thorium, indicate that most of the plutonium deposited on soil infiltrates to depths of less than eight inches.

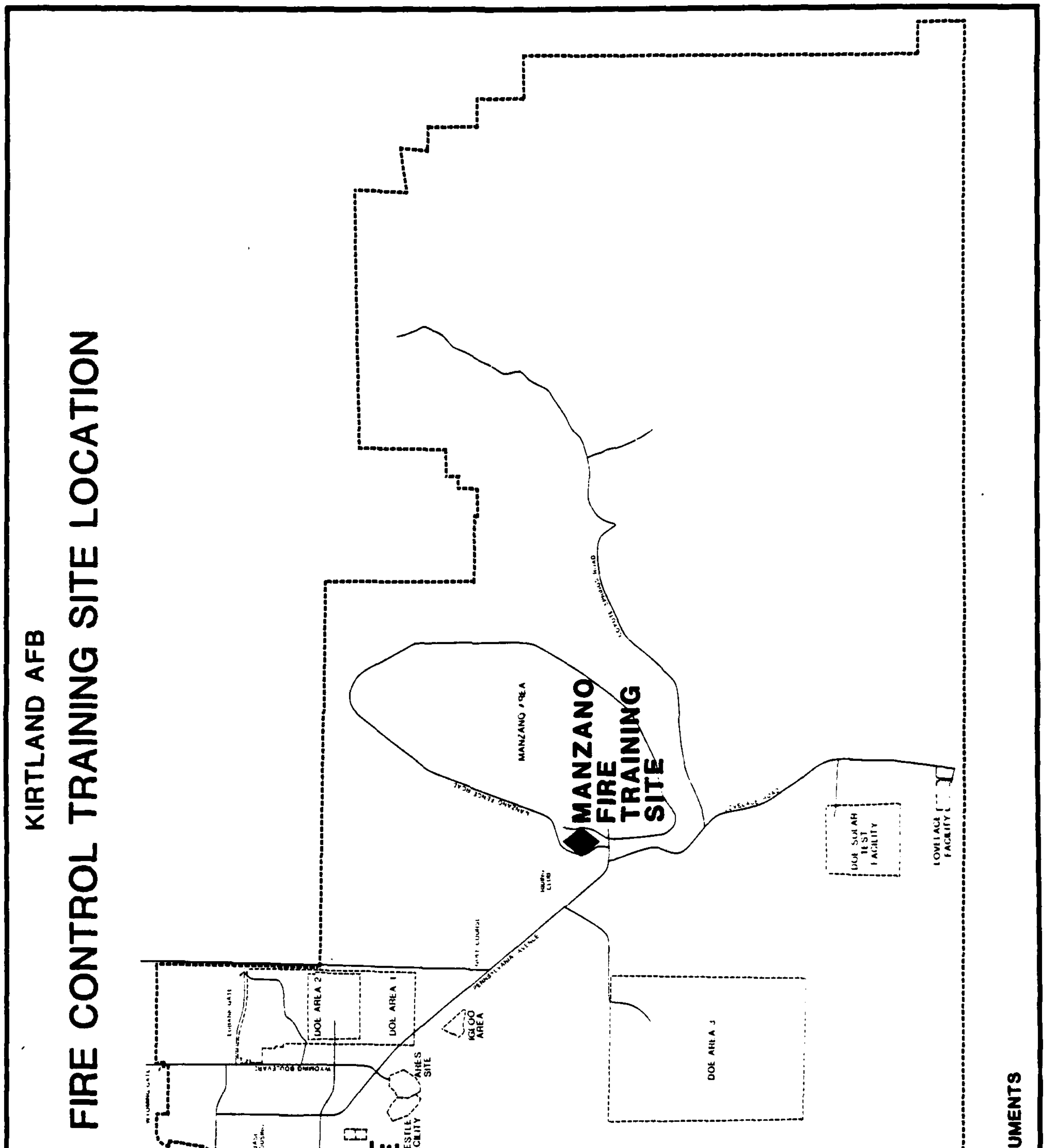
Trainees entering the areas wear protective suits, masks, and other equipment which are cleaned after each field exercise by a contract laundry in Santa Fe, New Mexico. Waste paper, tape, and other contaminated material is compacted, bagged, stored, and disposed of off-site when enough has accumulated. Approximately 100 bags of this low-level waste material is generated per year.

Translocation of material outside the fenced boundaries of the training sites has occurred at several locations. A routine perimeter survey of the eight training sites with sensitive radiation detection instruments in April 1978 indicated two areas adjacent to the training sites with radioactivity levels of 3 to 40 times background levels. The seeded thorium was detected in a 600-1200 ft^2 area at the southwest corner of training site TS-6. A smaller contaminated area of 100-125 ft^2 was detected at the northwest corner of training site TS-7. These areas were decontaminated on May 23, 1978 by scraping away the top foot of soil and placing it inside the boundaries of the training areas. Subsequent radiation levels were within an acceptable range.

Fire Control Training

The Kirtland AFB Fire Department (KFD) performs fire control training fire control training activities on a quarterly schedule in an area near the FAA tower (Figure 4.3). The present fire control training facility was constructed about 5 years ago and consists of an airplane

FIGURE 4.3



KIRTLAND AFB

FIRE CONTROL TRAINING SITE LOCATION

mock-up on a concrete pad. Jet fuel is applied to the mock-up from an on-site storage tank and then set on fire. Only non-contaminated fuel is used. AFFF Foam is used to extinguish the fire. The concrete liner in the pit has some fractures but, because of the small size of the fractures and infrequent use of the pit, it is doubtful that much liquid has infiltrated into the ground. Runoff from the pit is discharged to a nearby arroyo, and the considerable plant life in the arroyo does not appear to have been adversely effected.

Prior to construction of the present facility, fire control training was conducted in the same general area using unlined pits. The pit was soaked with water (to minimize fuel infiltration) and approximately 200 to 300 gallons of fuel was placed in the pit, ignited and extinguished with AFFF foam. Because the residual fuel could not be reignited since it contained fire control chemicals, it was allowed to infiltrate/evaporate. During this period contaminated and waste fuels were used and training sessions were conducted twice per week.

The unlined pits utilized for fire control training in the past would tend to allow more fuel infiltration than the present lined facility. Based on estimates provided by the Fire Department personnel, about 100 to 600 gal/yr of residual fuel and AFFF foam were left in the pits following the training sessions. It is not known if significant amounts of this residual material was infiltrating into the ground or if most of it was evaporating.

The Fire Department personnel stated that the old unlined fire control training pits were sometimes used for indescriminate disposal of waste solvents and oils from the base shops. They estimate that the quantity of waste disposed in the pits was about 1 to 2 55-gal drums per month. This was practiced for quite a few years prior to construction of the present fire control training facility.

Another fire training area was identified at the Manzano Base (Figure 4.3). There was limited information found on the procedures used, the duration and frequency of fire training exercises conducted at this location. Based on the history of the Manzano Base operations and the relative size of the facilities, it is estimated that the level of training exercises was less intense than at the Kirtland AF Base fire training area. The training procedures probably consisted of applying

water and fuel on the ground in a diked area without a liner to prevent infiltration. A small area (about 400 square feet) of surface soil contamination was observed.

Fuels Management

The KAFB fuels management storage system consists of a number of underground and aboveground storage tanks in various locations throughout the base. The fuels handled are JP-4, diesel, mogas and avgas. There is one 4.2-million gallon JP-4 tank and one 2.1-million gallon diesel tank located in Storage Area K with numerous smaller tanks located there and in other locations throughout the base. Table 4.4 summarizes the fuel tankage.

Waste petroleum fuels are placed in a 10,000-gallon tank located in the Field Maintenance area. This tank is periodically emptied by a contract reclaimer.

Some of the larger KAFB fuel tanks have spill prevention controls such as level switches and cut-off valves. All aboveground tanks greater than 2,000 gallon are diked. Underground tanks are pressure tested quarterly to unseen leaks.

A number of fuel spills have occurred in the past. For the most part these are relatively small spills which occur on the flightline during aircraft fueling operations. For instance, during the period of January through July 1981, approximately 70 fuel spills occurred with the largest being about 150 gallons. Most of these spills were in the 1 to 3 gallon range. Fuel spill records are kept but are disposed of after a two-year period.

A number of Kirtland AFB personnel were questioned concerning larger spills (some of these persons have worked on-site for 30 years). Also some written reports on significant spill incidents were reviewed. The information on the four significant spill incidents identified is summarized in Table 4.5.

As fuel tanks are used for a period of time, a residue of settled material builds up in the bottom. A standard procedure which was used in the past by the Air Force at other bases was to treat and dispose this sludge by land spreading on a site with appropriate drainage characteristics, allowing the sludge to air for a period to volatilize the fuel (4 wk when temperatures >32°F) and then landfilling the inert

TABLE 4.4

KIRTLAND AIR FORCE BASE FUELS STORAGE

	JP-4	Diesel	Mogas	Avgas	Solvent	Deicing Fluid
Number of Tanks	14	51	33	2	1	1
Maximum Tank Volume (gal)	4,200,000	2,100,000	20,000	1,000	10,000	6,000
Minimum Tank Volume (gal)	2,000	150	150	--	--	--
Approximate Total Storage Volume (gal)	1,400,000	4,400,000	160,000	2,000	10,000	6,000

Note: Information taken from "1606th ABW OPLAN, 80-6, OPR:DE", September 1, 1980.

Table does not account for tankage added or deleted since issuance of report.

TABLE 4.5

KIRTLAND AIR FORCE BASE SPILL INCIDENTS

Date	Location	Liquid Spilled	Quantity Spilled	Comments
Unknown	Helicopter Area at Building 1034	JP-4	500 gal	No remedial action.
1954-1955	Storage Area K at new railroad tracks	JP-4	1,000 gal	No remedial action.
January, 1979	Sandia Laboratory at Steam Plant	No. 2 Diesel	500 gal	Oil and wash water retained and recovered.
September, 1980	Building 908	Oil with low-level PCB (19 mg/1)	3,000 gal	Oil retained and recovered. Contaminated soil excavated, wrapped in plastic, disposed in KAFB landfill.

sludge or leaving it in-place. It has been determined by the Air Force, however, that the land at Kirtland AFB is not appropriate for this treatment technique. The last time sludge was removed from tanks at KAFB was 5 to 6 years ago. At that time the sludge was sent to contract disposal. The sludge disposal procedure used in previous years is presently unknown.

Sandia National Laboratories

Sandia National Laboratories is a prime contractor of the Department of Energy (DOE), and is involved in the research and development of advanced weapons systems. Established in 1945, the facility was operated by the University of California until 1949, when the Sandia Corporation was formed as a subsidiary of the Western Electric Company to operate the labs as a service to the U.S. Government. Since that time, the labs have served as a prime contractor to the Atomic Energy Commission (AEC), Energy Research and Development Administration (ERDA), and DOE. At the present time, Sandia Labs is the largest tenant organization at Kirtland AFB.

A variety of radioactive and non-radioactive hazardous wastes are generated by Sandia National Laboratories depending on the on-going research projects. Most of the radioactive waste consists of low-level fission products and induced activity and solid material contaminated with uranium. Tritium produced in fusion experiments, intermediate-level encapsulated beta-gamma sources, depleted uranium, and scrap from machining operations also account for a small amount of radioactive solid waste material. A small quantity of low-level liquid waste is generated at Sandia Labs. This waste is solidified and handled as a solid waste.

Solid radioactive wastes generated at Sandia National Laboratories are presently disposed of in an active landfill on DOE property in Technical Area III or shipped to Los Alamos Scientific Labs for retrievable storage. The low-level fission products/induced activity, and uranium or tritium contaminated material is disposed of in the active landfill. Encapsulated beta-gamma sources are trucked to the disposal site, encapsulated in concrete, and disposed of at the DOE site. All transuranic (TRU) wastes are shipped to Los Alamos.

A number of non-radioactive toxic and/or hazardous wastes generated at Sandia National Laboratories during the course of research activities are listed in Table 4.6. These wastes are primarily organic, and consist mainly of chemicals, oils, and solvents. Smaller amounts of inorganic materials, composed mainly of reagents, metallic oxides, and mineral acids, are also generated. These chemical wastes are disposed of in the existing chemical landfill located in the extreme southeastern corner of DOE property in Technical Area III.

Lovelace Inhalation Toxicology Research Institute

The Lovelace Inhalation Toxicology Research Institute (ITRI) engages in biomedical and environmental research on 135 acres located in the extreme southern portion of KAFB. The facility consists of three main laboratory buildings, 13 dog kennel buildings, a small animal housing building, a large storage building, an engineering and facility services building, an environmental-level alpha radiochemistry building, and additional small laboratory and support buildings.

A variety of radioactive and non-radioactive hazardous waste have been generated through research activities at the Lovelace Inhalation Toxicology Research Institute. The principal radionuclides used during the last two years are shown in Table 4.7. Radioactive waste activity is generally on the order of nanocuries to microcuries, but higher level wastes are occasionally generated. Both solid and liquid radioactive wastes are generated at the facility. The non-radioactive hazardous waste consists of biological, chemical, and known or suspected carcinoge ic wastes. Biological wastes include tissue samples, animal carcasses, and animal excrement. Chemical wastes include organic and other liquid wastes, and a small amount of solid chemical waste, derived mainly from chemical processes related to sample preparation and analytical techniques. The known or suspected carcinogenic wastes, including benzo-alpha-pyrene, benzanthracene, asbetos, figerglass, benzene, chloroform, and carbon tetrachloride are used in small quantities for analytical procedures, instrument maintenance, and other purposes.

Small amounts of low-level radioactive wastes are releasted to the domestic sewer system and ultimately to the sewage lagoons at Lovelace. The six sewage lagoons, four of which are presently used, are located

Table 4.6

SANDIA LABS HAZARDOUS WASTE SUMMARY

Acetic Acid
Alumium Trichloride
Ammonium Bifluoride
Amyl Nitrate
Beryllium Chloride
Chromate Compounds
Chromium/Sulfuric Acid Etchant Solution
Hydrochloric Acid
Hydrogen Peroxide
Kerosene
Lithium Hydride
Lithium Metal
Magnesium Metal
Methyl Ethyl Ketone
Nitric Acid
Nitro Methane
Octane
Oil
Perchloric Acid
Petroleum Ether
Phenol
Polychlorinated Biphenyls
Potassium Hydroxide
Potassium Nitrate
Pyrogallic Acid
Soda Lime
Sodium Hydroxide
Sodium Metal
Sodium Nitrate
Solvents (mixed)
Sulfur Monochloride
Sulfuric Acid
Thallium
Thosphoric Acid
Turpentine
Zirconium Tetrachloride

TABLE 4.7

PRINCIPAL RADIONUCLIDES USED AT THE LOVELACE INHALATION TOXICOLOGY RESEARCH INSTITUTE

Alpha-emitting radionuclides

^{241}Am	^{238}U
^{238}Pu	^{235}U
^{239}Pu	^{228}Th
^{244}Cm	

Beta-gamma emitting radionuclides

^{134}Cs	^{147}Pm
^{144}Ce-^{144}Pr	^{106}Ru
^{99}Tc	^{169}Yb
^{67}Ga	^{75}Se
^{14}C	^{3}H
^{35}S	^{59}Fe

AD-A123 312 INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH HAZARDOUS MATERIA..(U) ENGINEERING-SCIENCE INC ATLANTA GA NOV 81 F08637-80-G-0009 2/4

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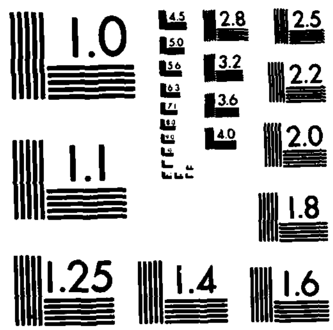


west of the main ITRI complex. The lagoons are fenced and marked with radiation warning signs. The wastes are biologically treated in the lagoons and the high evaporation rate prevents any effluent discharge.

Liquids with intermediate levels of beta-gamma or alpha are collected in 5-gallon "Jerry Jug" type containers and transferred to two holding ponds located southeast of the facility by Health Protection personnel. Additonal radioactive liquid wastes are stored temporarily in a 200-gallon holding tank which is periodically emptied into the holding ponds. High-level radioactive liquid wastes are solidified and disposed of off-base.

Low-level radioactive solid wastes are compacted and stored in drums in the holding area awaiting off-site commercial disposal. Intermediate-level solid wastes are placed directly in drums without compaction prior to disposal off-base. High-level radioactive solid wastes are packaged in special drums and disposed of by commercial disposal.

All high-level transuranic (TRU) wastes receive special treatment. These wastes include solid and solidified waste containing elements such as ^{238}Pu, ^{239}Pu, ^{241}Am, ^{244}Cm, and ^{252}Cf. Liquid TRU waste is solidified and handled as a solid waste. The solid TRU waste is sealed in special 20-year retrievable container and disposed of at a site in Los Alamos, New Mexico.

Most of the non-radioactive biological waste generated at ITRI is disposed of in the KAFB sanitary landfill. Estimated amounts of animal waste are between 7000 and 20,000 pounds per year. Animal excreta is washed into the sewer system and ends up in the sewage lagoons. An incinerator was used until recently to dispose of radioactive contaminated animals. During the last several years, these waste have been buried in a landfill site east of the ITRI facilities (RB-10).

Non-hazardous solid chemical waste are dissolved and poured down the sink drains or dumped directly into the Lovelace sewage lagoons. Hazardous solid chemical waste are placed directly into marked drums for eventual disposal according to RCRA requirements.

The amount of liquid chemical waste generated at ITRI is appprox-imately 100 gallons per year, not including carcinogenic or radioactive waste. These wastes are typically collected in 5-gallon jerry jugs or other containers. Aqueous wastes are emptied into the sewage lagoons if

non-hazardous salts are formed. Limestone neutralization is practiced for wastes containing heavy metals. Volatile solvents in small quantities are evaporated from small open tanks. Solid chemical wastes are dissolved and poured down the drain, dumped in the sewage lagoons, or placed in drums if hazardous. The small amounts of carcinogenic waste, much of which is also radioactive, are disposed of with the low-level radioactive waste.

General Electric Plant

The Air Force owns a plant in Albuquerque that is rented and operated by the General Electric Company, Aircraft Engine Business Group (GE), and manufactures aircraft engine parts (USAF Plant No. 83). The plant is located about 6 miles west of KAFB, just east of the Rio Grande River. The GE plant was constructed in 1955 by the Atomic Energy Commission who used it to manufacture metal parts for nuclear weapons (no radioactive materials). In 1967, the USAF bought the plant and GE took over operation.

The GE plant primarily manufactures metal and plastic parts for jet engines (turbines, etc.) and does some subassembly. The parts are shipped to a GE plant in Evandale, Ohio where final assembly is performed. The product usage split is about 60 percent military and 40 percent commercial. GE presently employs about 1,800 persons at the plant and is the largest single commercial employer in Albuquerque.

Most of the non-hazardous refuse presently produced at the GE plant is sent to the South Broadway landfill which is operated by the City of Albuquerque; however, some is sent to the KAFB landfill. Over the years non-hazardous refuse from the GE plant has either been disposed in City of Albuquerque landfills or the various landfills located at KAFB.

The production activities at the GE plant result in the generation of a number of wastes classified as hazardous under the RCRA regulations. Table 4.8 presents an estimate of the 1980 hazardous waste production. The estimated annual hazardous waste production rate is 113,000 lb with approximately 88 percent of this being waste acid solutions This corresponds to an average daily generation rate of 310 lb or about 37 gallons. Records of hazardous waste production in past years are not available, however, GE personnel estimate that the waste production rate has trippled since start-up of the facility.

TABLE 4.8

USAF PLANT NO. 83 - GENERAL ELECTRIC

CURRENT HAZARDOUS WASTE PRODUCTION

	Estimated* Hazardous Waste Production (Lb/Yr)
Waste solvents	1,100
Waste plating solution and sludges	2,000
Waste stripping and cleaning bath solutions and sludges	1,400
Waste chemicals and chemical contaminated debris	4,600
Waste acid and caustic baths	99,000
Waste paint and sludges	5,000
TOTAL	113,000

* Taken from the GE Plant's RCRA Part A Permit Application

The GE plant hazardous waste management facilities consist of drum storage areas, waste storage tanks and waste treatment tanks (neutralization). The approximate locations of these facilities are shown on Figure 4.4. Hazardous waste disposal is not practiced on the plant property.

At present, the GE plant hazardous wastes are transported off-site to several disposal or reclaimation contactors. Waste oils are sent to Mesa Oil Company for recovery, though, prior to 1979 they were used for dust control on roads at a nearby police honor farm. Etching acids are sent to Kaehor Metal Finishing for recovery of metals. Other hazardous wastes are shipped to hazardous waste landfills located in California and Alabama. None of the plant's hazardous materials are presently disposed in New Mexico.

GE has been utilizing contract Class I landfills for hazardous waste disposal for the past 10 to 12 years, however, specific records of the disposal activities are limited. At various times facilities in Texas, California and Alabama have been used.

GE personnel estimate that, prior to about 1970, most of the hazardous liquid wastes generated at the plant were sewered, and thus, entered the Albuquerque municipal sewer system. Some hazardous solids were probably disposed of in City of Albuquerque and/or the KAFB landfills, but these quantities are believed to be relatively small.

DESCRIPTION OF PAST DISPOSAL METHODS

Off-site Disposal Methods

City of Albuquerque Wastewater Treatment Plant

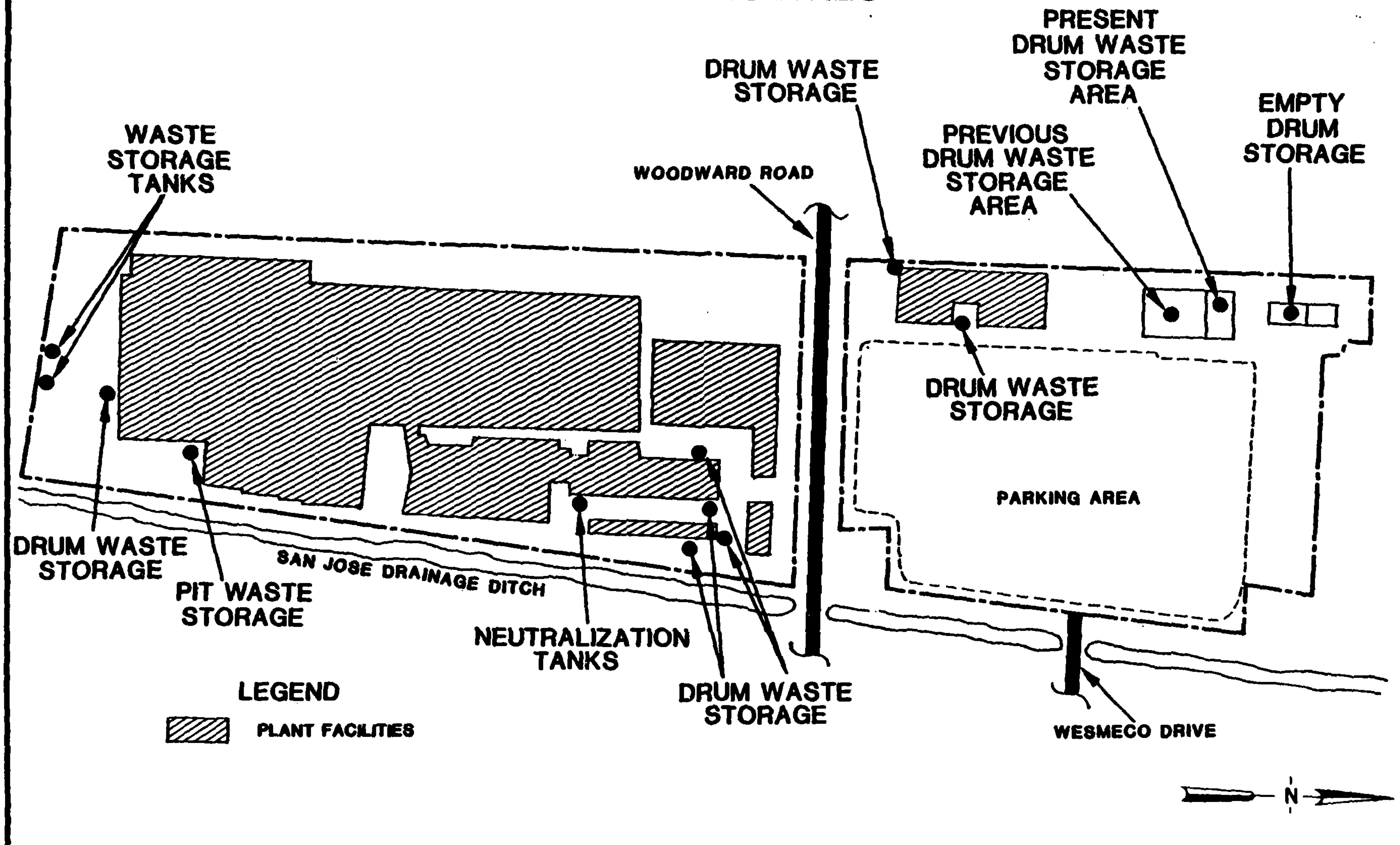
A portion of the wastewater generated at KAFB is discharged to the City of Albuquerque sewer system. The City of Albuquerque built a wastewater treatment plant (WWTP) in the 1930's, referred to as Plant 1. The plant provided primary and secondary treatment (trickling filter) of the City's sewage.

In 1962 a second WWTP was constructed (Plant 2). This plant was originally built as a trickling filter plant but was converted to activated sludge in 1976. Since the start-up of Plant 2, the secondary treatment portion of Plant 1 has been deactivated. At present, Plant 1

FIGURE 4.4

KIRTLAND AFB

USAF PLANT No. 83 – GENERAL ELECTRIC HAZARDOUS WASTE MANAGEMENT FACILITIES



SOURCE: G.E. RCRA PART A APPLICATION

provides only primary treatment while all the city's wastewater (including effluent from Plant 1) is treated in the Plant 2 activated sludge system. The wastewater from Kirtland AFB enters several city trunk sewer lines with a portion going to Plant 1 the remainder flowing directly to Plant 2.

The waste sludge from the city WWTP's has always been disposed of through direct land application. The major area used for this disposal is the mesa south of Kirtland AFB. The city plans to build a sludge treatment facility in Montessa Park. Sludge will be dewatered, irradiated and stored for land disposal.

Waste Disposal Oil Contractor

The Defense Property Disposal Office (DPDO) handles the contracting for removal of recoverable waste oil generated by the Air Force at KAFB. The present contractor is American Fleet Service. The DPDO personnel interviewed stated that American Fleet serves as a transporter and broker and most of the processing of the oil is done outside of Albuquerque.

On-site Waste Management Facilities

The on-site facilities which have been used for management and disposal of waste can be categorized as follows:

Radioactive waste burial
Landfills
Grease traps, sand traps, drain fields
Storm sewer systems
Surface impoundments
Miscellaneous sites

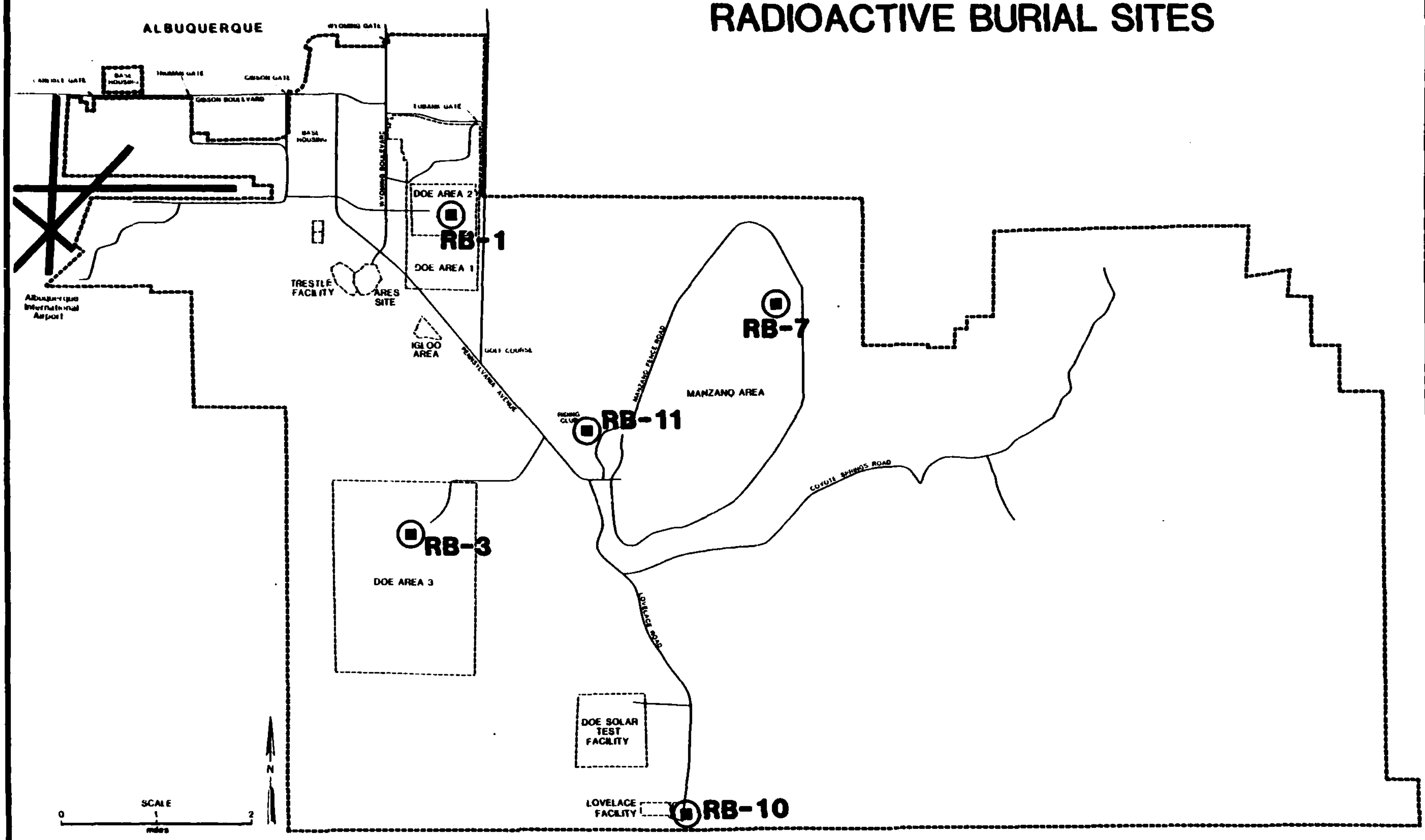
These waste management facilities are discussed individually below.

Radioactive Waste Burial

Low level solid radioactive wastes have been disposed of at five landfills located within the boundaries of KAFB and DOE (Figure 4.5). Each landfill is discussed in detail in this section.

Radioactive landfill RB-1 is located in the northeast section of DOE Technical Area II. This landfill, shown on Figure 4.6, was operated for approximately ten years, ending in 1959. During this period there were no regulations pertaining to the disposal of wastes. Most of the detailed records dealing with the wastes buried at this site have been destroyed, but, a generalized summary of the wastes disposed of at the

LOCATION OF RADIOACTIVE BURIAL SITES

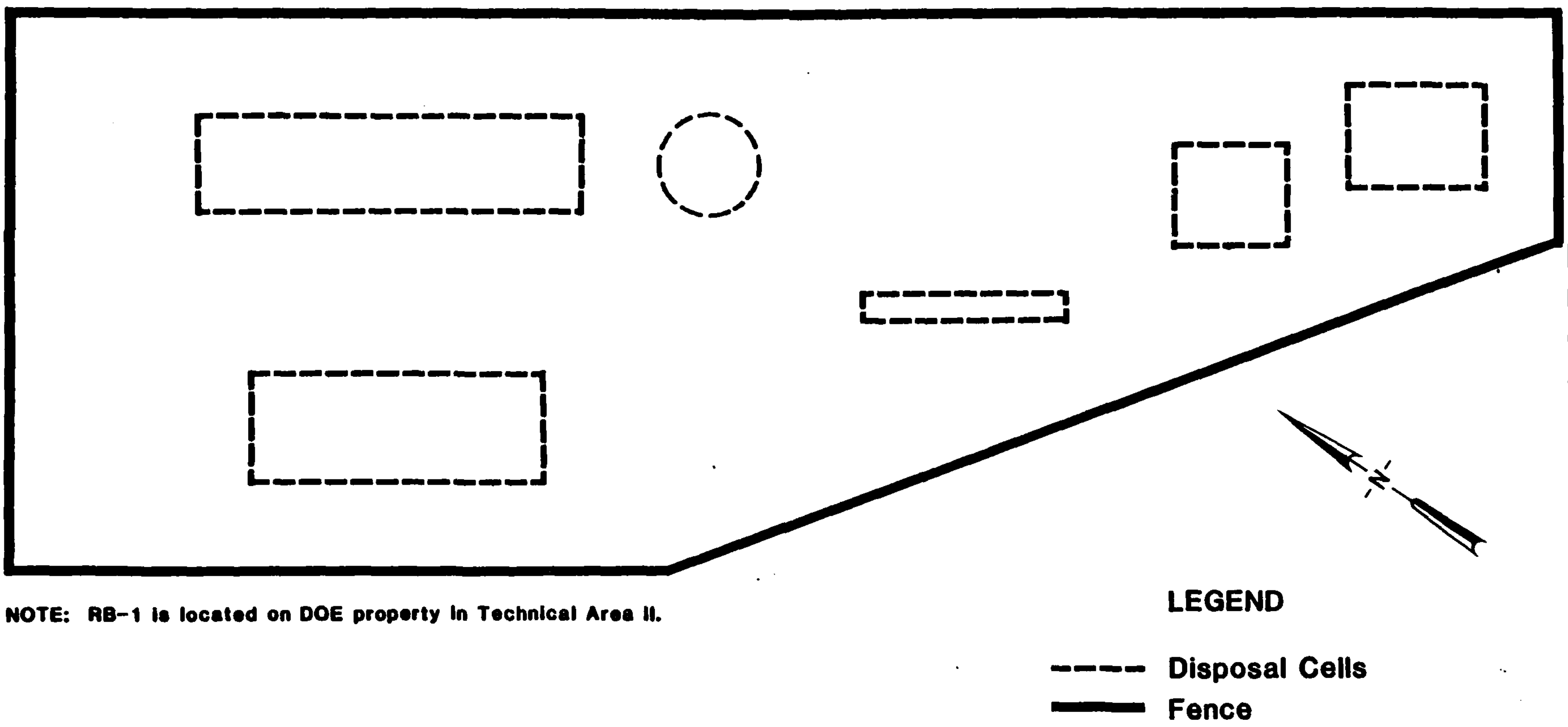


SOURCE: KIRTLAND AFB DOCUMENTS

NOTE: Other sites in the RB Series are shown on Figure 4.15. There is no RB-2.

FIGURE 4.6

RADIOACTIVE BURIAL SITE RB-1



NOTE: RB-1 is located on DOE property in Technical Area II.

SOURCE: SANDIA NATIONAL LABORATORIES DOCUMENTS

site is shown in Table 4.9. As shown, the wastes consist primarily of low-level fission products, induced activity, and tritium. The activities reported in Table 4.9 were determined at the time of disposal and would be lower today due to radioactive decay.

Radioactive wastes at site RB-1 were disposed of by trenching. Trenches of various dimensions were dug into the ground surface, filled with the radioactive waste material, and backfilled. The trenches were capped with concrete when the disposal site was closed in 1959. At present, the area is fenced and well-marked with radiation warning signs. Existing surface radiation levels are not significantly higher than background levels.

The radioactive waste disposal site RB-3 shown on Figure 4.7 is located in DOE Technical Area III in the southwest section of Kirtland AFB. The landfill, which is still active, consists of side-by-side areas for classified and unclassified radioactive wastes. Together, these areas occupy a total of about 1.6 acres.

Detailed records are available on the quantity of material disposed of at the site and a summary of radioactive waste disposed of between March 1959 and December 1980 is presented in Table 4.10. A large portion of the waste consists of depleted uranium, induced activity, and low-level fission products. A very small amount of plutonium is also present.

Waste disposal at the site is accomplished by the method of trenching. After the pit or trench capacity is used, the holes are backfilled and those inside the classified waste disposal area are also capped with concrete. In the classified waste disposal area, two pits are presently being utilized for the disposal of classified radioactive wastes. Two trenches are also still in use in the unclassified waste disposal area. Areas are fenced, locked, and marked with radiation warning signs. Both disposal sites are in a controlled-access area in DOE Technical Area III.

In 1969, measurements of gross beta activity, total strontium, cesium-137, and gamma activity were obtained in five test holes around the perimeter of the landfill site. No significant migration of radionuclides was noted. Additional measurements around the landfill since that time have also failed to indicate radionuclide movement as described by Simmons 1980).

TABLE 4.9

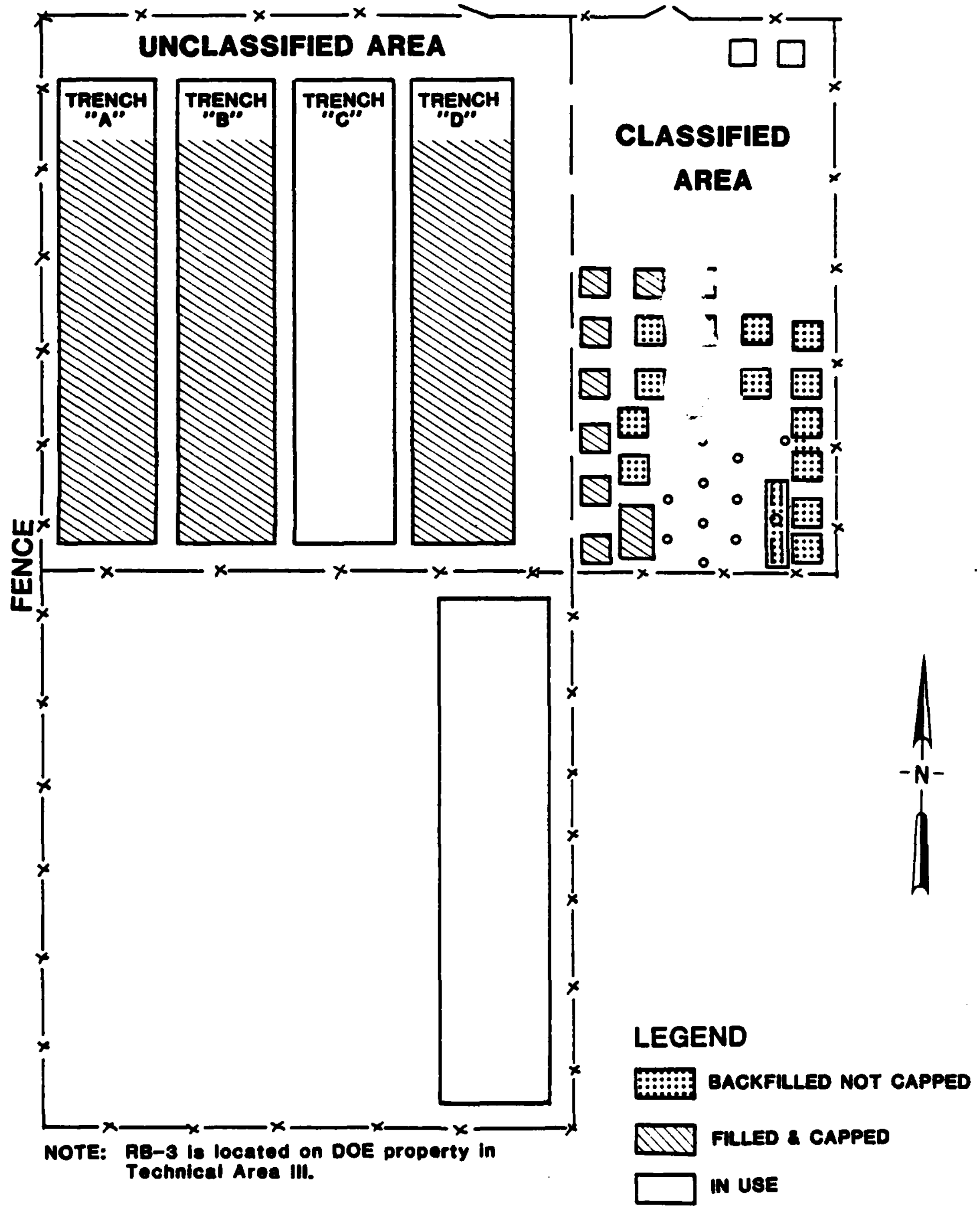
RADIOACTIVE WASTES DISPOSED OF AT SITE RB-1,

DOE TECHNICAL AREA II

Type of Waste	Volume (Cubic Meters)	Activity (Ci or kg)
TRU Contact Handled	1.44	0 Ci
Uranium/Thorium	20.02	0 kg
Fission Products	29.08	203.33 Ci
Induced Activity	173.34	2033.33 Ci
Tritium	87.23	610 Ci
Alpha	3.54	10.17×10^{-6} Ci
Total volume	314.65 cubic meters	

Waste disposed of from 1949 to February 1959.

ACTIVE RADIOACTIVE WASTE DISPOSAL AREA RB-3



NOTE: RB-3 is located on DOE property in Technical Area III.

SOURCE: SANDIA NATIONAL LABORATORIES DOCUMENTS

TABLE 4.10

RADIOACTIVE WASTES DISPOSED OF AT SITE RB-3,

DOE TECHNICAL AREA III

Type of Waste	Volume (Cubic Meters)	Activity (Ci or Kg)
TRU Contact Handled	1.39	0 Ci
Uranium/Thorium	182.25	4376 kg
Fission Products	143.12	3067.46 Ci
Induced Activity	474.55	3067.46 Ci
Tritium	274.17	1357.05 Ci
Alpha	71.01	24.98×10^{-6} Ci
Total Volume	1146.49 cubic meters	

Figure 4.5 shows the location of radioactive landfill RB-7 in the northeast section of the Manzano Area. No records exist prior to July 1, 1959 pertaining to waste disposal at this site. From July 1, 1959 to December 31, 1963 a total of 449 cubic feet of radioactive waste, consisting of tuballoy and oralloy swipes, carrying case swipes, contaminated gloves, paper clothing, respiration discs, and dust was buried at this site. The disposal of low-level radioactive waste material was discontinued in 1963.

When the disposal site was in operation, the waste was buried in trenches in 15" by 15" by 8" cardboard boxes. Burial criteria required radiation of less than 200 mr/hr on any surface or 10 mr/hr at a distance of 1 foot from the surface of any material to be buried. After

Waste disposed of from March 1959 December 1980 is included.

use, the site was backfilled, fenced, and marked with radiation warning signs. The site is presently within the boundaries of the Manzano Area, an area of controlled access.

Periodic surveys of the area have not detected increased radiation levels near the site. The most recent survey of the fenced area, perimeter, and downslope area did not detect radiation levels above natural background levels. The most recent survey was completed on June 8, 1980.

Landfill RB-10 is operated at the Lovelace facility for burial of radioactive contaminated animals (Figure 4.5). The landfill has only been operated during the last several years and consists of a trench and operation.

A radioactive landfill, shown on Figure 4.5 as site RB-11, was formerly operated by the Radiobiology Laboratory, Biophysics Branch, Air Force Weapons Laboratory (AFWL). In 1970, the research facility became part of the Environics Branch of the AFWL's Civil Engineering Research Division, and in 1974 the 40-acre site was turned over to the KAFB Riding Club, its present owner.

The RB-11 disposal site was open from about 1960 to 1971. No accurate records were kept on the amounts of wastes that were disposed of. The radioactive wastes consisted primarily of animal carcasses which had received doses of radioactivity, animal excreta, and contaminated solid wastes. Most of the radioactivity is in the form of induced

activity and short half-lived elements, but it is likely that several millicuries of elements with longer half-lives may be present. It is estimated that the following numbers of animals were disposed of at the site: sheep, 1000 to 1500; burros, 60 to 75; goats, 40 to 50; chickens, 100 to 120; rats, 500-1000; cows, 5 to 10; and dogs, 50 to 60. Some of the waste was buried in drums, and some was not. An undetermined amount of liquid waste was also disposed of, along with small amounts of hazardous and toxic chemicals, including acids, mercury, cyanides, and silver.

Six trenches were used for the disposal of wastes. Four of the trenches are approximately 50 feet long by 9 feet deep by 2 feet wide. The trenches are covered with approximately four feet of earth; two have an asphalt cover and the other two a compacted earth cover. Two more recent trenches are approximately 100 feet long by 20 feet deep by 6 feet wide. These trenches also have a four-foot earth cover. The site is marked with radiation warning signs but is not fenced. A radiation survey of the site was conducted during November and December 1974. No surface radiation levels were found at the site in excess of natural background levels.

Inasmuch as very little documentation of waste disposal activities is available prior to 1959, it is not certain that all radioactive waste disposal sites have been located. Certainly the major disposal sites have been identified in this report; other disposal sites, if any, are likely to contain smaller amounts of radioactive material. Recent aerial radioactive surveys of the base have identified only one other area that contains detectable levels of man-made radioactivity in addition to those already identified. This site is located approximately 1/2 mile south of Coyote Springs Road and 1/2 mile east of Lovelace Road.

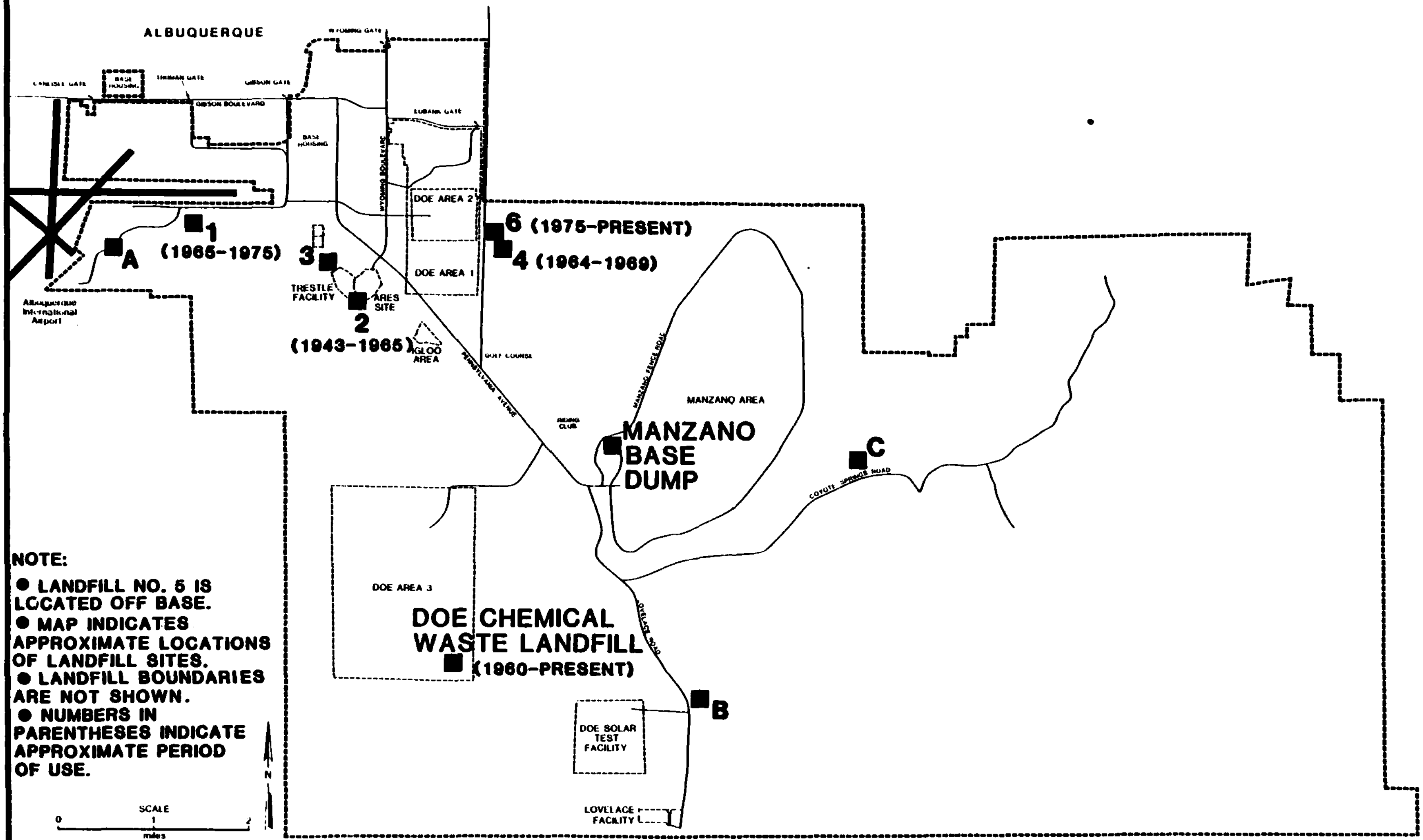
Sanitary Landfills

Nine landfills which were not used for radioactive disposal were investigated as part of this project. The locations of the landfill sites identified are shown on Figure 4.8. Information about the landfills is summarized in Table 4.11 and discussed below.

Landfill No. 6 is presently being used for refuse disposal and is located east of DOE Area I. Landfill No. 6 is shown on Figure 4.9 and has an area of about 24 acres. The landfill is located on Air Force

FIGURE 4.8

KIRTLAND AFB
LANDFILL LOCATIONS



NOTE:
- LANDFILL NO. 5 IS LOCATED OFF BASE.
- MAP INDICATES APPROXIMATE LOCATIONS OF LANDFILL SITES.
- LANDFILL BOUNDARIES ARE NOT SHOWN.
- NUMBERS IN PARENTHESES INDICATE APPROXIMATE PERIOD OF USE.

SOURCE: KIRTLAND AFB DOCUMENTS AND SITE SURVEY

TABLE 4.11

SUMMARY INFORMATION ON LANDFILLS, DUMPS AND BURIAL SITES

Landfill	Period Operation	Approximate Area (acre)	Types of Wastes	Estimated Quantity of Waste (yd^3)	Method of Operation	Closure Status	Geological Setting	Surface Drainage	Comments
1	1965-1975	30-40	• Ground refuse • Hardfill • Evidence of hazardous wastes	600,000	Area Fill	Closed but not completely covered	Terrace & sediment sands and gravels	South to Tijeras Arroyo	• Drainage Swale traverses the fill, evidence of water contamination • Evidence of hazardous wastes • Exposed refuse on South side
2	1943-1965	50-70	• General refuse	1,000,000	Area Fill	Closed, well covered.	Upper Santa Fe Group Sands	South to Tijeras Arroyo.	• Well covered and graded. • No evidence of hazardous waste visible.
3	NA	5-10	• General refuse	200,000	Pit	Closed, well covered.	Terrace & sediment sands and gravels	South to Tijeras Arroy.	• Relocated portion of Landfill 2.
4	1964-1969	45-50	• Combined City of Albuquerque and KAFB • General refuse	550,000	Trench	Closed, well covered.	Upper Sante Fe Group sands	West to Tijeras Arroyo.	• Operated by City of Albuquerque on AF property. •
6	1975-1981	24	• General base refuse	75,000	Trench	Active	Upper Sante Fe Group sands	West to Tijeras Arroyo	• Current disposal site.

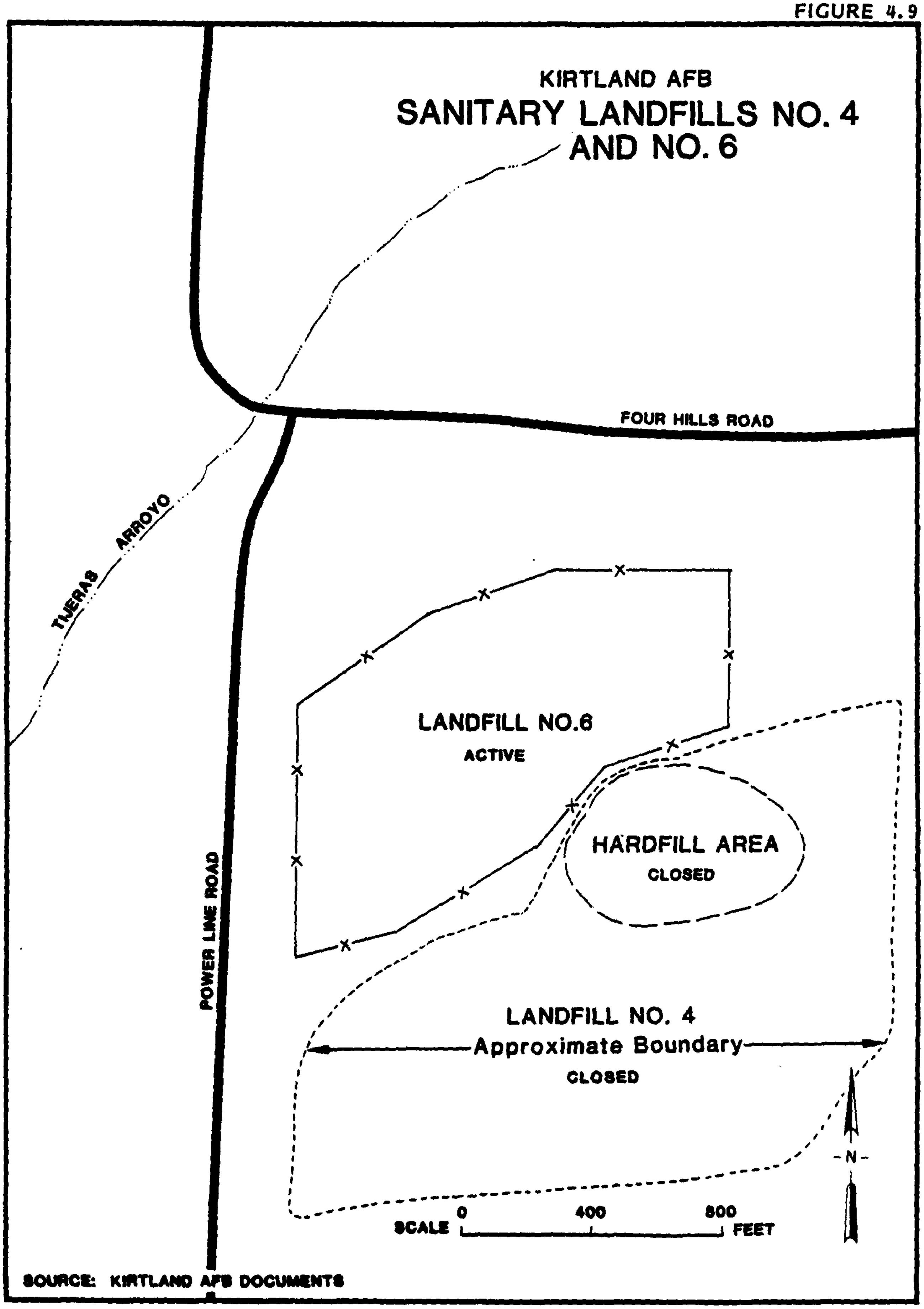
TABLE 4.11 *(Continued)*

Landfill	Period Operation	Approximate Area (acre)	Types of Wastes	Estimated Quantity of Waste (yd^3)	Method of Operation	Closure Status	Geological Setting	Surface Drainage	Comments
A	Unknown Probable 1940's	3-5	• General Refuse • Landfill	10,000	Surface Dump Open-Burning	Abandoned	Terrace & sediment sands and gravels	South to Tijeras Arroyo	• Some evidence of old burning area
B	Unknown	1-3	• General Refuse	5,000	Surface Dump Open-Burning	Abandoned	Terrace & sediment sands and gravels	To Arroyo Del Coyote	• Refuse from Civil Engineering Research Facility
C	Unknown	1	• General Refuse	500	Surface Dump	Abandoned	Thin terrace & pediment	To Arroyo Del Coyote	• Refuse from DOE operation. • No evidence of hazardous waste.
Manzano Base Dump	Unknown	1-3	• General Refuse	5,000	Surface Dump Open-burning	Abandoned	Thin terrace & pediment materials	To Arroyo Del Coyote	• Refuse from Manzano Housing Area
DOE Chemical Landfill	1960-1981	2	• Hazardous Chemical Wastes	10,000	Separate pits for segregated wastes	Completed pits well covered. Active pits open.	Terrace & pediment sands and gravels	To Arroyo Del Coyote	• Operated by Sandia • 1972 Investigation showed no soil contamination • Area well fenced

TABLE 4.11 (Continued)

Landfill	Period Operation	Approximate Area (acre)	Types of Wastes	Estimated Quantity of Waste (yd^3)	Method of Operation	Closure Status	Geological Setting	Surface Drainage	Comments
RB-1	1949-1959	0.3	• Low-level fission procedures • induced activity tritium	412	Trench & cover	Landfill in-active. covered & capped with concrete. Fenced, marked, in high security area.	Terrace & pediment sands & gravels	To Tigeras Arroyo	• Well covered closed site • Located in high security area • Surface radiation levels approximately equal to background levels
RB-3	1959-1981	1.6	• Depleted uranium • induced activity • low-level fission products • very small amounts of plutonium	1,500	Trench or pit & cover	Landfill active. Concrete cover in classified area. Earth cover in in other area.	Terrace & pediment sands & gravels	To Arroyo Del Coyote	• Active site • Cover provided • Located in high security area • No migration of radiation detected.
RB-7	1959-1963	0.1	• Radioactive contaminated tuballoy and oralloy swipes carrying case swipes, gloves, clothing, res-piration discs, and dust	17	Trench & cover	Landfill in-active. Covered with earth. Fenced, marked, in high security area.	Thin terrace & pediment materials over crystal-line bedrock	To Arroyo Del Coyote	• Cover provided • Closed site • Located in high security area • Surface radiation level not above background level.
RB-10	1980-81	0.1	• Radioactive contaminated animals	75	Trench & cover	Landfill active. Earth cover.	Terrace & pediment sands and gravels	To Arroyo Del Coyote	• Active site • Operated by Lovelace
RB-11	1960-1971	0.1	• Radioactive contaminated animals	580	Trench & cover	Landfill in-active. Covered with	Terrace & pediment sand and	To Arroyo Del Coyote	• Closed site • Surface radiation level not above

FIGURE 4.9


KIRTLAND AFB
SANITARY LANDFILLS NO. 4 AND NO. 6
FOUR HILLS ROAD
TIJERAS ARROYO
POWER LINE ROAD
LANDFILL NO.6
ACTIVE
HARDFILL AREA
CLOSED
LANDFILL NO. 4
Approximate Boundary
CLOSED
SCALE
0
400
800
FEET
N
SOURCE: KIRTLAND AFB DOCUMENTS

property and is operated by AF personnel. General non-hazardous refuse from the entire base is disposed in Landfill No. 6. The landfill is fenced, however, the fence is not effective at prohibiting persons from entering on-foot. Water spraying is used on a daily basis to control dust at Landfill No. 6.

The landfills used for KAFB general refuse disposal in past years are identified as 1, 2, 3, 4, A, B,C, and Manzano fill on Figure 4.8. Landfill No. 1 is a relatively large area located east of the FAA control tower which was used during the period of 1965 to 1975. The approximate extent of the fill area is shown on Figure 4.10. The 30-40-acre fill has an uncovered bank which faces Tijeras Arroyo where a considerable amount of debris is exposed. There is evidence of significant erosion of the cover. Runoff from the runway area traverses the Landfill No. 1 (see Figure 4.10); the landfill was built on both sides of the stream. During reconnaissance, evidence of hazardous materials was observed (chemical drums, oil-soaked insulation, etc.). Approximately 30 5-gal cans, some containing an unknown liquid, were observed on the southwest side of the fill area.

Landfills No. 2 and No. 3 are located in the area of the trestle test facility. Landfill No. 2 was utilized during the period of 1943 to 1965 and encompasses an area of 50 to 70 acres. Landfill No. 3 is actually a location where some material which had originally been disposed in Landfill No. 2 was moved during construction of the trestle. Both of these landfills are presently well covered and no refuse is visable.

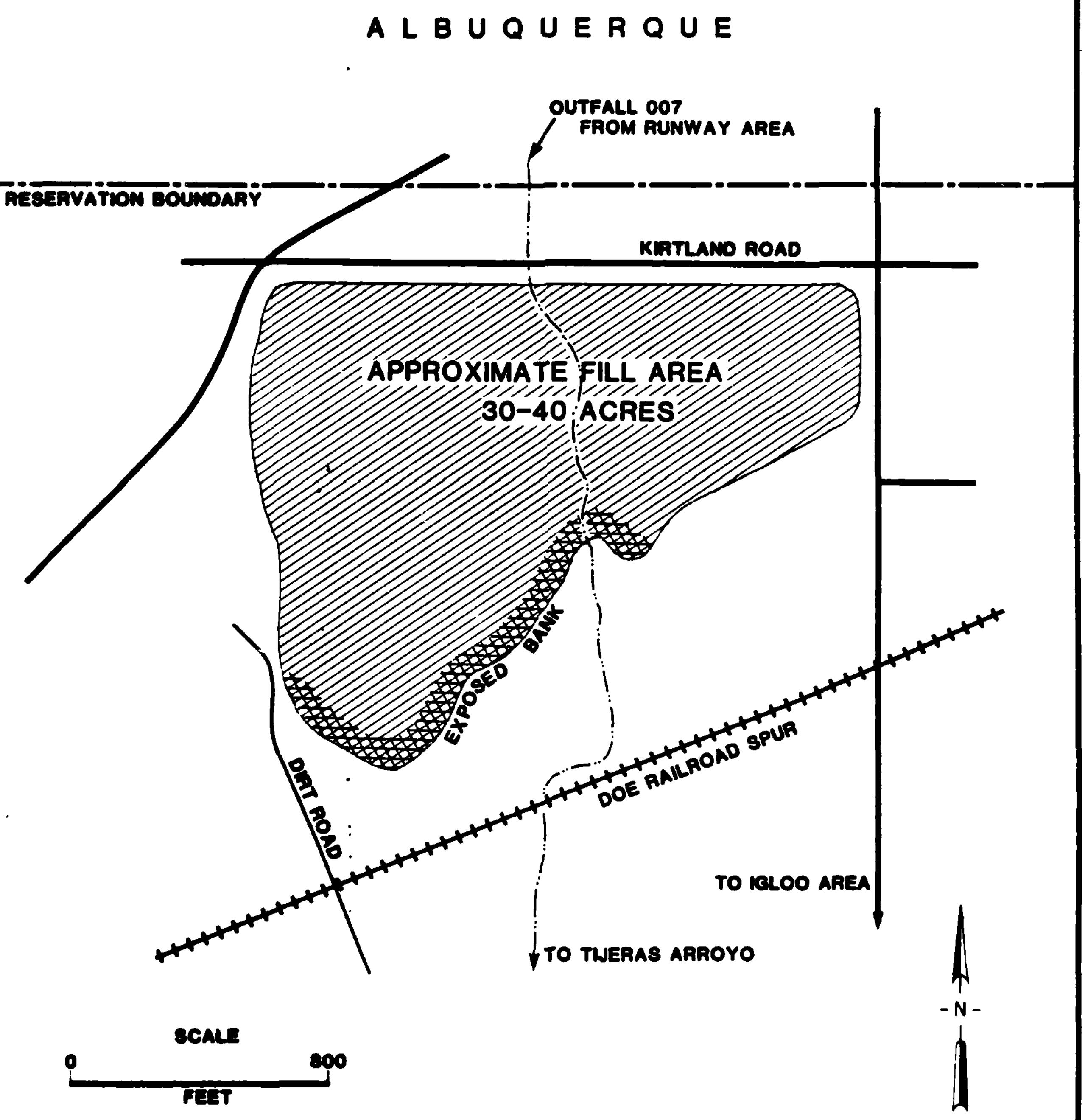
Landfill No. 4 is in the same area as the presently active landfill (Landfill No. 6). This site was operated by the City of Albuquerque from 1964 through 1969 and used for co-disposal of KAFB and City refuse. The site has been well covered and no waste is exposed to the surface (Figure 4.9).

The sites identified as A, B, C and the Manzano Base dump on Figure 4.8 are locations where significant open dumping has occurred in the past. Site A shows evidence of some open burning (melted glass) while sites B and C appears to be mainly demolition debris. The Manzano dump is located near an old contonment area which was probably the source of the refuse. Evidence of hazardous materials was not observed at any of these previously mentioned dumping sites.

FIGURE 4.10

KIRTLAND AFB

SANITARY LANDFILL NO. 1



SOURCE: KIRTLAND AFB DOCUMENTS, AERIAL PHOTOGRAPHS AND FOOT RECONNAISANCE

Sandia National Laboratories operates a chemical waste disposal landfill located in the southeast portion of DOE property in Technical Area III (see Figure 4.11). This landfill was opened around 1960 and is still in operation.

A site plan for the DOE chemical landfill is shown in Figure 4.11. The landfill is surrounded by a 6-foot chain link force with a gate that is locked when not in use. Separate pits are provided for disposal of mineral acids, oxidizing agents, reducing agents, organic chemicals, reactive chemicals and bulky materials, metals and neutral salts. A small chromic acid evaporation pit is also located at the landfill (lined with 8-mil tefllon and hypalon). During the site visit uncovered refuse was observed in several of the disposal cells.

A contaminant migration study was conducted at the DOE chemical landfill site in 1972 (Sandia Report SLA-73-0339). Soil samples were taken from 20 and 50 foot below grade at the locations identified in Figure 4.11. The soils were analyzed for beryllium, chromium, lead, cadmium, mercury, cyanide and phenol, none of which were found in detectable concentrations.

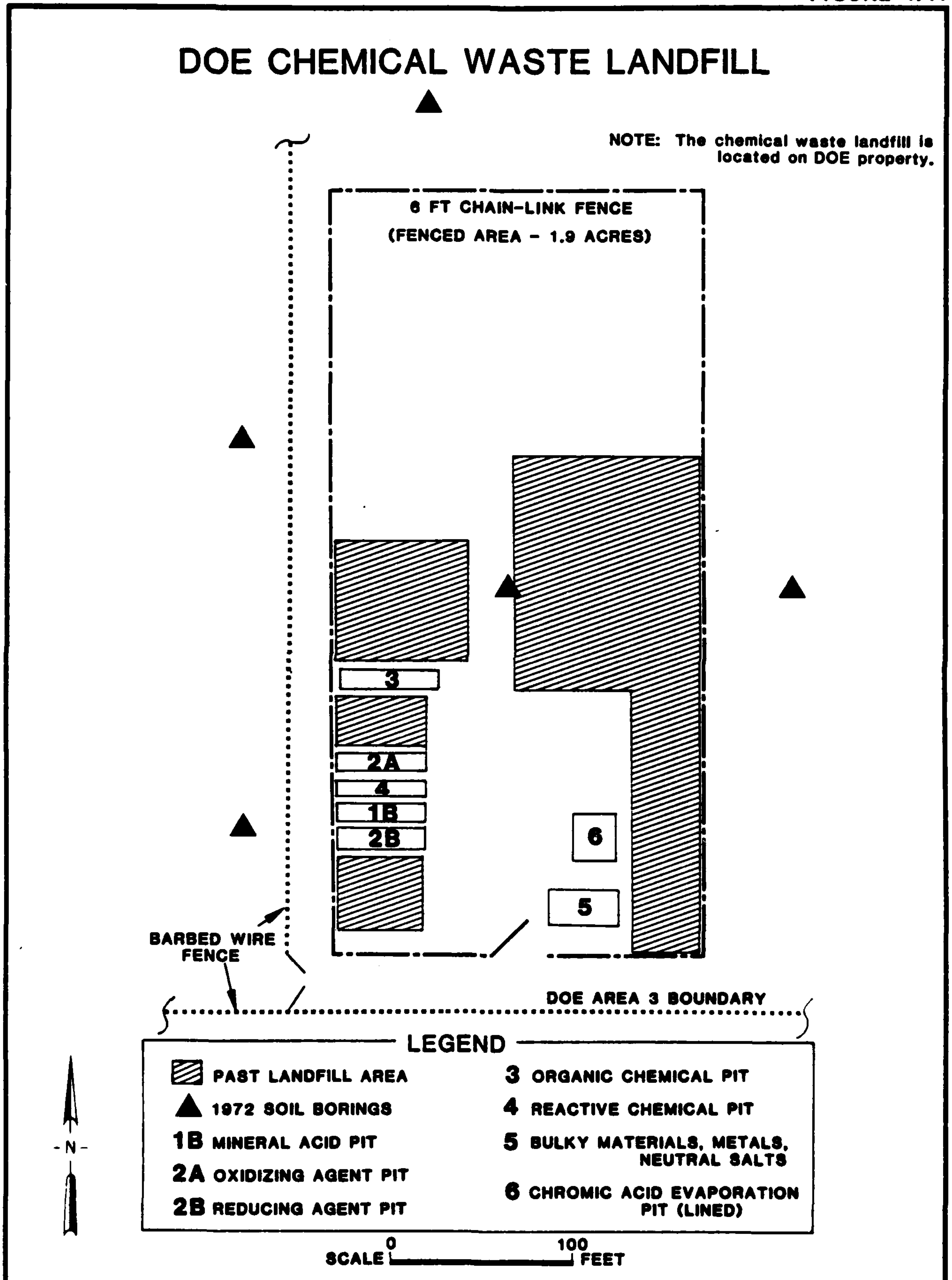
Table 4.6 shows an inventory of the types of hazardous chemical wastes handled by Sandia in 1980. Most of these wastes are presently transported to off-site contract disposal/recovery, however, prior to 1979, some of them were disposed at the DOE chemical landfill. Accurate records of the wastes disposed in the landfill during past years were not identified during this investigation.

The Sandia facility was established in 1949 and the chemical landfill was started about 1960. Sandia personnel interviewed could not provide information on the Sandia chemical waste management practices during the 1949-1960 period.

Grease Trap, Sand Traps, Drain Fields

Numerous industrial shop facilities have utilized grease traps (oil skimmers), sand traps, or drain fields for pretreatment or disposal of shop waste streams. A list of major shop facilities utilizing grease traps, sand traps or drainage fields is presented in Table 4.12. Most of those devices and facilities were installed during the late 50's to early 60's. The grease traps are used for pretreatment before discharge into the sanitary sewer system or the storm sewer system. The oil from

FIGURE 4.11



SOURCE: SANDIA NATIONAL LABORATORY WASTE MANAGEMENT SITE PLAN, 1980

TABLE 4.12

GREASE TRAPS, SAND TRAPS, DRAINAGE FIELDS
DISPOSAL METHODS

Shop/Lab Name (Facility No.)	Type of Device	Influent Source	Hazardous Materials Handled	Discharge Point
Corrosion Control (482)	Sand trap w/drain field	Shop liquid wash waste disposal	PD-680 Paint stripper	Drain field at shop
Propulsion Br. (336)	Grease/oil trap degreaser tank	Shop wastes, inside wash stall, old remover	PD-680 oils, carbon	Storm sewer
Paint Shop (20681)	Rock bed	Paint wastes, thinners	Thinners	Drain field at shop
Entomology Shop (20684)	French drain	Pesticide rinsate	Pesticide rinsate	Drain field
NWEF Washrack (2636)	Grease/oil trap	Aircraft washdown	Oil, solvents soap	Storm sewer
AFWL (617)	Drain field	HF/DF scrubbers	HF,DF	Limestone pit to drain field

the traps is removed periodically by a contractor and reclaimed or disposed of off-site. Sand traps and drainage fields have been used for disposal of oils, solvents paint strippers (phenolic and non-phenolic) and acids. Some of the sand traps contain limestone rock for treatment of waste/battery acids.

Storm Sewer Systems

Several industrial shops discharge to the storm sewers. A list of the major discharges to the storm sewer system is shown in Table 4.13. This table indicates the shop name, the influent source, the hazardous material handled and the pretreatment device, if any. The shops, wash-rack facilities and hangers 1001 and 1002 may discharge several types of hazardous waste liquids into the storm sewer systems. Also, the Propulsion Branch (Bldg. 336) discharges oil and solvent bearing liquid waste into an oil water separator that drains to the storm sewer system.

The storm drainage systems from Building 336 flow beneath the main airbase runways and converge into a single pipe adjacent to the FAA facility (Building 638). From the storm drainage pipe the discharge flows into a surface ditch and then to the Tijeras Arroyo. The surface ditch is normally dry because the water infiltrates into the ground. The storm drainage system also carries runoff from the west base housing area.

The storm drainage system for hangers 1001 and 1002 also culminate in one large drainage pipe. This pipe runs beneath the main runways and discharges to an open culvert which traverses the abandoned sanitary landfill No. 1 and ultimately to the Tijeras Arroyo. The storm sewer system for these hangers does not include any runoff from residential areas.

Surface Impoundments

Several surface impoundments have been used for treatment of sanitary wastes and for disposal or holding of radioactive wastes. These sites are shown on Figure 4.12 as WL-1, RL-1, RL-2, RL-3.

Sanitary waste including some shop and laboratory waste collected in the northeast portion of the base are biologically treated in two waste lagoons (WL-1). The lagoons are lined with concrete on the sides and clay on the bottom. The treated effluent from the lagoons is used as irrigation water at the base golf course.

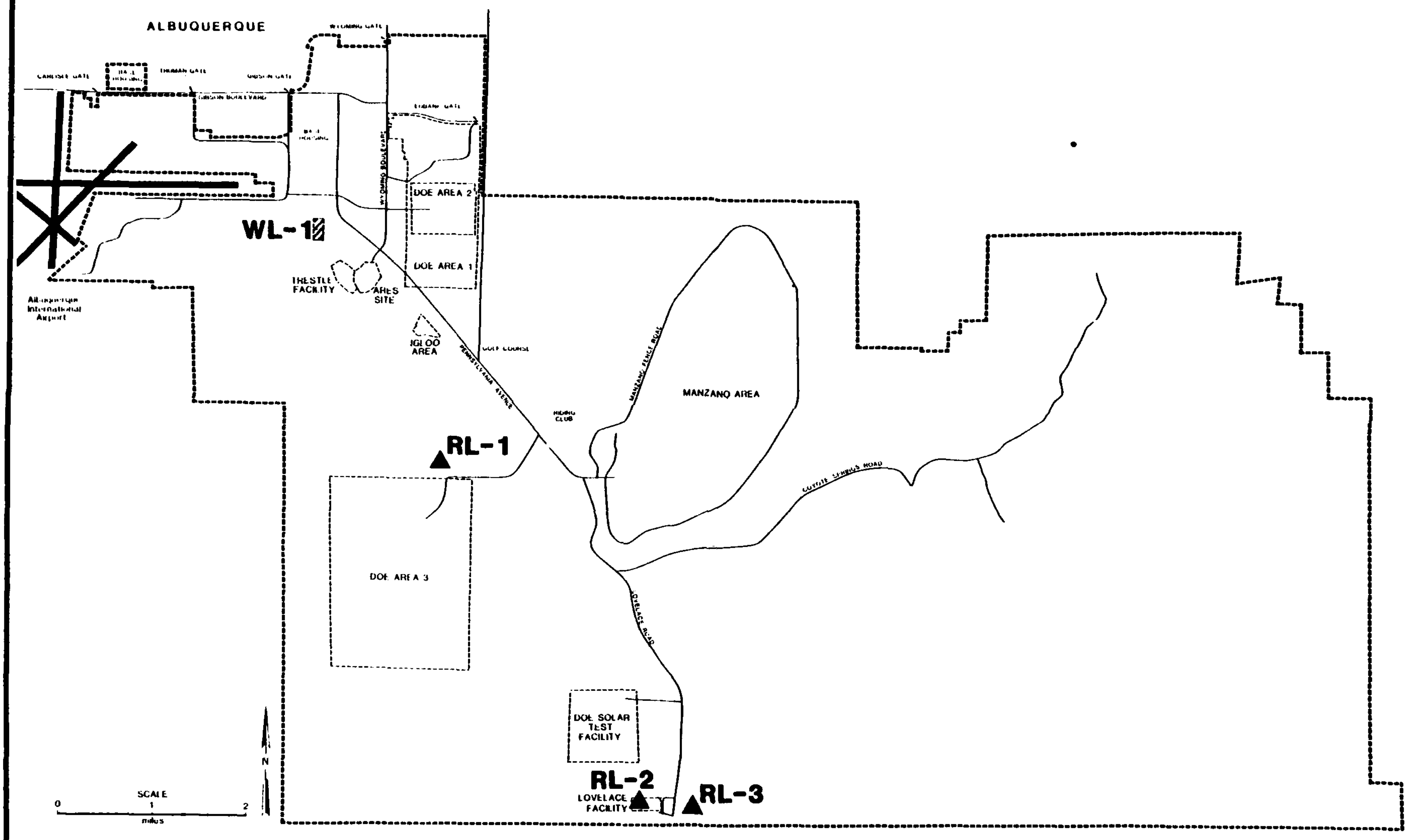
TABLE 4.13

STORM SEWER SYSTEM DISPOSAL

Shop Name (Bldg. No.)	Hazardous Materials Handled	Influent Source	Pretreatment Method
Paint Shop (1001)	Paint booth water wastes	Paint booth washdown, cleanout	None
Plating and anodizing shop (1001)	Plating wastes	Batch plating baths	Dilution prior to discharge
H3/H53 Phase Dock (1000)	PD-680	Solvent washdown of aircraft	None
NWEF washrack (2636)	Oils, solvents, PD-680	Washdown of aircraft	Oil/water separator
Propulsion Br. (336)	Oils, solvents	Inside wash stall, old degreaser tank	Grease/oil trap
C-130 Maint. (1009)	PD-680	Washdown of aircraft	Oil/water separator

FIGURE 4.12

KIRTLAND AFB
LOCATION OF SURFACE IMPOUNDMENTS CONTAINING WASTE WATER



SOURCE: KIRTLAND AFB DOCUMENTS

The surface impoundments shown as site Rl-1 consist of two evaporation ponds which formerly received contaminated water through the liquid waste disposal system (LWDS) from DOE Technical Area V. Initially, water contaminated with short-lived radioisotopes such as ^{24}Na, ^{60}Co, ^{54}Mn, ^{46}Sc, and ^{95}Nb from the Sandia Engineering Reactor (SER) in Area V was released through the LWDS to a drain field. After the drain field collapsed, the liquid was discharged to the two ponds. An analysis performed in 1971 of water from the ponds and sampling wells around the ponds produced radioactivity levels within permissible limits and did not show evidence of contamination around the ponds. More recent analyses have not detected significant radioactivity in the ponds.

The Lovelace ITRI maintains a number of sewage lagoons (site RL-2) for disposal of low-level radioactive liquid wastes. A total of six lagoons, covering approximately 10 acres, receive all the domestic sewage from the facility, as well as small quantities of radionuclides. The lagoon system is shown in Figure 4.13. Lagoons 1, 2, and 3 have liners placed over the excavated dirt bottoms, whereas lagoons 4, 5, and 6 have compacted soil bottoms but no liners. The first two lagoons have not been used since about 1970. At present, waste enters lagoon 3 and overflows into lagoons 4, 5, and 6 as necessary. There is no surface water discharge from the lagoons; water loss from the lagoons occurs primarily by evaporation.

The two lysimeters in the area of the lagoons reach a depth of 12 feet below the bottom of the lowest lagoon. Periodic sampling of the lysimeters has not indicated percolation of water from the lagoons. The lagoons themselves are also periodically sampled for radioactivity. Recent samples from the lagoons show concentrations of radionuclides below permissible radioactivity limit in effluents to unrestricted areas.

Intermediate-level liquid radioactive wastes at ITRI are stored in two radioactive liquid waste holding ponds designated as site RL-3. The site is southeast of the main ITRI complex, as shown on Figure 4.14. Each pond is approximately 20' by 20' by 5' deep, and is lined with three layers of 10-mil polyethylene sheet laminated with nylon cord. The ponds are covered with 1/2-inch hardware cloth to keep out animals

FIGURE 4.13

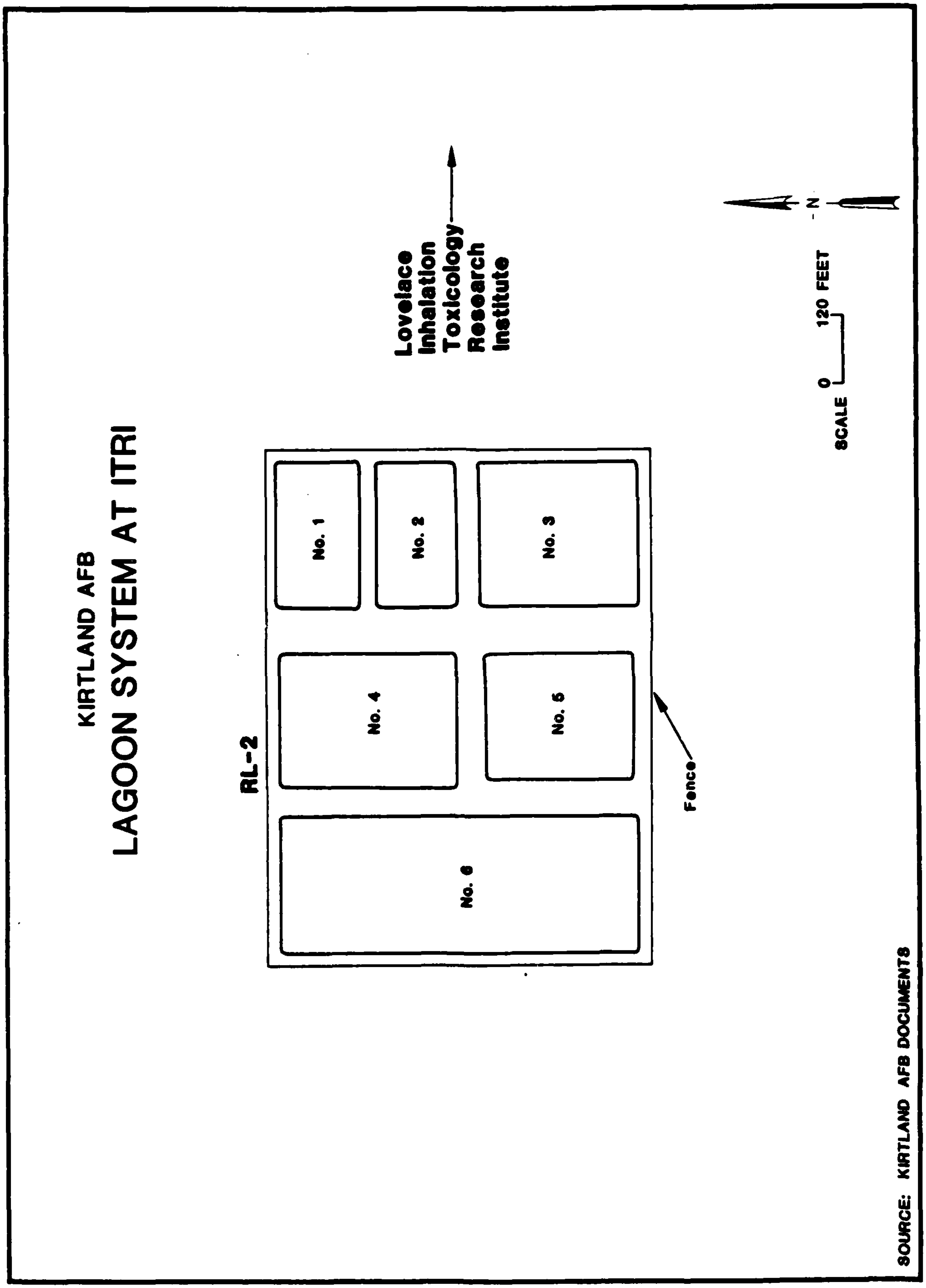
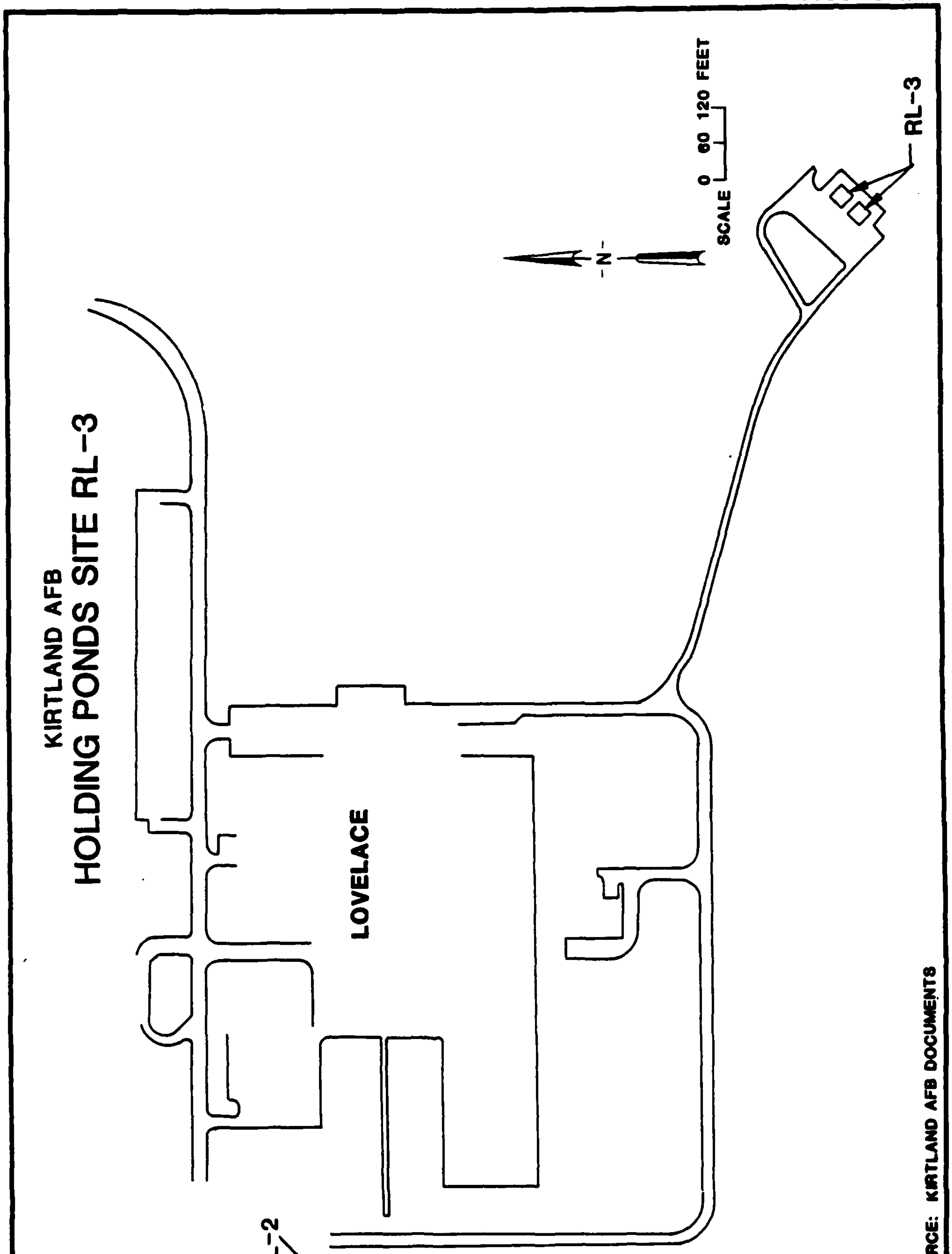

KIRTLAND AFB
LAGOON SYSTEM AT ITRI
Lovelace Inhalation Toxicology Research Institute
RL-2
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
Fence
N
SCALE
0
120 FEET
SOURCE: KIRTLAND AFB DOCUMENTS

FIGURE 4.14



KIRTLAND AFB
HOLDING PONDS SITE RL-3

ES ENGINEERING-SCIENCE

and birds. Surrounding the ponds is a curbed concrete pad with an eight-foot-high security fence around the perimeter. The fenced area also includes a compactor and holding area for radioactive waste drums.

The holding ponds receive primarily intermediate-level liquid wastes from decontamination procedure wash waters and solubility study filtrates. Major radionuclides include ^{90}Sr, ^{137}Cs, and ^{241}Am. These liquids are collected in the lab in 5-gallon "Jerry Jugs" and transferred to the ponds by Health Protection technicians. Typically, one pond is utilized at a time while the other evaporates to dryness. There is no aqueous discharge to the environment. Periodically, the liners and solids residue are removed, packed, and shipped off-site for commercial disposal. The liner is then replaced and the pond may be reused.

Radioactive Liquid Emergency Holding Tanks

A total of five radioactive liquid emergency holding tanks are located within the Manzano Area at Kirtland AFB. The sites, consisting of three 1000-gallon and two 10,000-gallon tanks, are shown as RB-4, RB-5, RB-6, RB-8, and RB-9 on Figure 4.15. The tanks were built to store radioactive liquid waste in the event that maintenance or storage areas should become contaminated and require cleaning. Each site is fenced and marked with radiation warning signs, and is in a controlled-access area. No records were located to indicate the type and amount of material, if any, contained at the five sites; however, it is known that nothing has been disposed of at the sites since at least December 1963. Recent surveys during 1978 and 1980 inside the fenced sites, around the fenced perimeter, and nearby water runoff areas indicate radiation levels are equivalent to background levels.

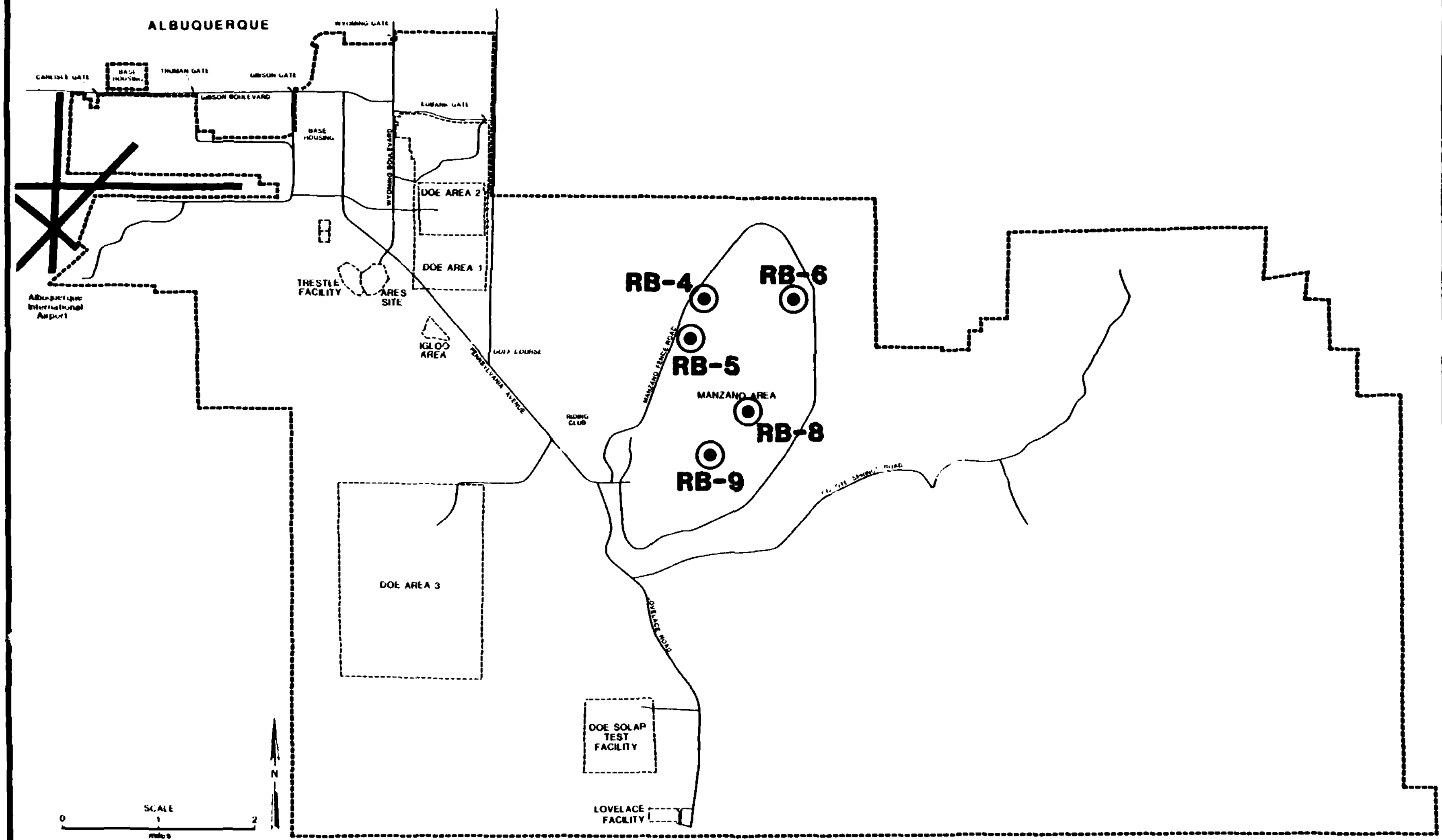
Dirt Mounds

Six dirt mounds have been identified as possible radioactive burial sites. The dirt mounds are shown as DM-1 through DM-6 on Figure 4.16. In the fall of 1971, an aerial survey was initiated in what was then Sandia Base to identify potentially contaminated areas. Areas showing radiation levels greater than 1/2 to 2 times background were resurveyed on the ground. Two dirt mounds were located with radiation levels approximately 2 to 3 times background levels. Since there was no indication what might be buried in any of the dirt mounds, radiation warning signs were posted at all six dirt mounds. Dirt mounds DM-1, DM-2, and

FIGURE 4.15

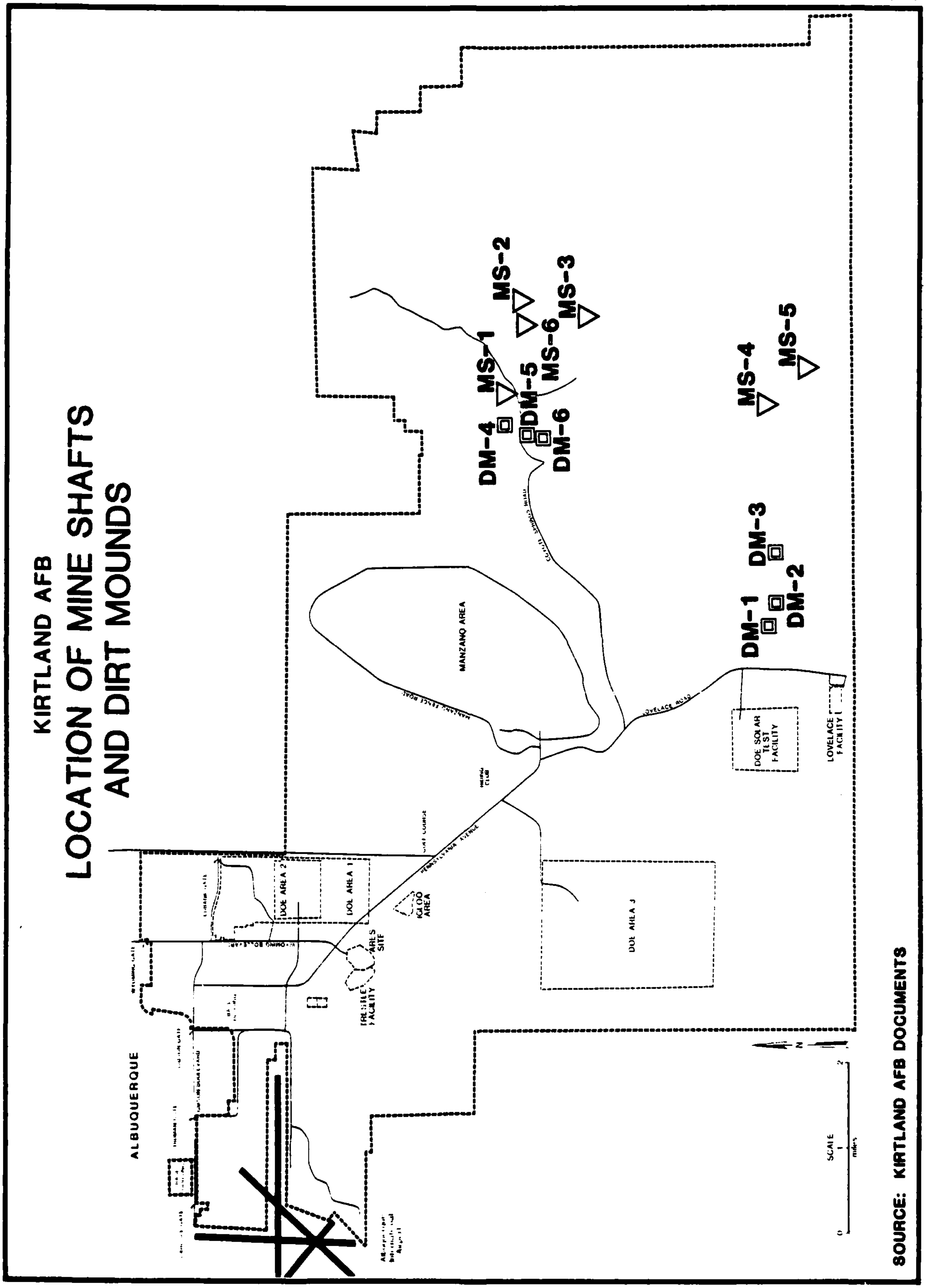
KIRTLAND AFB

LOCATION OF RADIOACTIVE LIQUID EMERGENCY HOLDING TANKS



SOURCE: KIRTLAND AFB DOCUMENTS

KIRTLAND AFB
LOCATION OF MINE SHAFTS AND DIRT MOUNDS



SOURCE: KIRTLAND AFB DOCUMENTS

DM-3 were also fenced. These three mounds were resurveyed during the fall of 1980 with no indication of radiation levels above background.

Mine Shafts

Two horizontal and four vertical mine shafts have been identified as possible radioactive burial sites. The mine shafts are shown as MS-1 through MS-5 on Figure 4.16. In a 1971 survey of potential radioactive burial sites on the former Sandia Base, several of these mine shafts exhibited radiation levels of 2 to 3 times typical background levels. There is no indication of what, if anything, is contained in the mine shafts. A more recent survey in 1980 with the fidler probe indicated no increase above background radiation levels at mine shafts MS-2, MS-4, MS-5, and MS-6. The other two areas (MS-1 and MS-3) were not rechecked.

EVALUATION OF PAST DISPOSAL ACTIVITIES AND FACILITIES

The review of past operation and maintenance functions and past waste management practices at Kirtland AFB has resulted in the identification of 31 sites containing hazardous waste materials and having the potential for migration of contamination off the base boundaries. Other sites were reviewed and eliminated from further evaluation based on the logic presented in the decision tree shown in Figure 4.1. Three sites (RB-1, RB-3 and the chemical waste landfill) are located on DOE owned property, not Kirtland AFB property and have been tabulated separately from the other 31 sites (Appendix I).

The 34 sites have been assessed using a rating system which takes into account characteristics of potential receptors, pathways of migration of contaminants, waste characteristics, and specific characteristics of the site related to waste management practices. The details of the rating procedure are presented in Appendix G and the results of the assessment are summarized in Table 4.14 for sites on Kirtland AFB and Table 4.15 for the three sites on DOE property. The sites are listed in order of ranking, based on the rating scores developed for the individual location. The rating system is designed to indicate the relative need for more detailed site assessment and/or remedial action.

TABLE 4.14

PRIORITY RANKING OF POTENTIAL CONTAMINATION SOURCES

KIRTLAND AFB

Rank	Site Name	Receptor %Assumed	Receptor Subscore	Pathways %Assumed	Pathways Subscore	Waste Characteristics Subscore	Waste Management %Assumed	Waste Management %NA or Missing	Waste Management Subscore	Overall Total %Assumed	Overall Total Score
1	Landfill No. 1	0	46	0	58	80	22	0	79	8	64
2	Fire Training Area	0	50	10	20	80	22	0	69	12	50
3	Landfill No. 4	0	46	0	26	70	22	0	67	8	49
4	Landfill No. 2&3	0	41	0	19	70	22	0	74	8	47
5	RB-11	0	37	0	21	90	11	0	59	4	46
(6)	RL-1	0	41	10	50	50	0	67	38	4	45
(6)	Landfill A	0	46	0	22	50	33	0	70	12	45
7	TS-1 through TS-8	0	41	0	21	80	0	56	53	0	44
8	Landfill No. 6	0	46	0	19	50	22	0	63	8	42
9	Wastewater Lagoons	0	41	20	59	50	11	22	14	12	41
(9)	RB-7	0	24	0	18	80	22	0	62	0	41
10	Entomology Shop	0	57	3	19	60	22	44	48	2	39
11	Landfill B	0	41	0	23	30	22	0	58	8	37
12	Manzano Fire Training Pits	0	37	0	24	50	22	0	43	8	36
13	Manzano Dump	0	31	0	21	30	22	0	51	8	34
14	Landfill C	0	24	0	18	30	22	0	58	8	32
(14)	RB-10	0	28	0	20	60	0	56	36	0	32
(15)	RL-2	0	28	10	20	60	0	67	25	4	30
(15)	RL-3	0	28	10	20	100	0	56	0	4	30
17	RB-4, RB-5, RB-6 RB-8, RB-9	0	20	0	14	50	22	33	21	8	23

TABLE 4.15

PRIORITY RANKING OF POTENTIAL CONTAMINATION SOURCES

SITES ON DOE PROPERTY

RANK	SITE NAME	RECEPTOR		PATHWAYS		WASTE CHARACTERISTICS	WASTE MANAGEMENT			OVERALL TOTAL	
		%ASSUMED	SUBSCORE	%ASSUMED	SUBSCORE	SUBSCORE	%ASSUMED	%NA or MISSING	SUBSCORE	%ASSUMED	SCORE
1	RB-3	0	41	0	17	100	0	0	53	0	46
1	RB-1	0	50	0	17	100	1	0	47	1	45
3	Chemical Waste Landfill	0	20	0	20	100	0	0	53	0	42

The information presented in Table 4.14 has been used as a guide for assigning priorities for further evaluation of the Kirtland AFB disposal areas (Section 5, Conclusions and Section 6, Recommendations). The rating forms for the individual waste disposal sites on Kirtland AFB are presented in Appendix H. Photographs of some of the key disposal sites are contained in Appendix F.

SECTION 5

CONCLUSIONS

SECTION 5

CONCLUSIONS

The goal of Phase I of the IRP was to identify the potential for environmental contamination from past waste disposal practices at Kirtland AFB and to assess the probability of contaminant migration beyond the base boundaries. Based on the results of the project team's field inspection, review of records and files, and interviews with base personnel, past employees and state and local government employees, the following conclusions have been developed. The conclusions are listed by category for the sites identified on Kirtland AFB. The sites on DOE property (RB-1, RB-3 and the chemical waste landfill) are not included in these conclusions nor the recommendations for Phase II. Evaluation information on the three DOE landfill sites is presented in Appendix J. Table 5.1 contains the priority ranking of potential contamination sources at Kirtland AFB.

1) Landfill Areas

a) Landfill No. 1 was identified as having the greatest potential for migration of contaminants off site (rating score of 64). The landfill was operated from 1965 through 1975 and is now closed. There is evidence indicating that hazardous materials have been disposed of in the landfill with the general refuse. The landfill is not completely covered and has an exposed face (about 30 feet in height) on the south side as well as several areas where the cover has eroded away or was not installed. A surface drainage discharge (about 50-100 gpm normal flow) which includes wastes from the shop area north of the landfill traverses the landfill and infiltrates into the ground prior to leaving the landfill area. The landfill is located within 500 feet of a drinking water well and within 400 feet of the base boundary. The distance to ground water is approximately 500 feet.

b) Other landfills (No.'s 4, 2, 3, A, 6, B, the Manzano Dump and C ranked in descending priority) are less likely to create potential

TABLE 5.1

PRIORITY RANKING OF POTENTIAL CONTAMINATION SOURCES

Rank	Site Name	Score
1	Landfill No. 1	64
2	Fire Training Area	50
3	Landfill No. 4	49
4	Landfill No. 2 & 3	47
5	RB-11	46
(6)	RL-1	45
(6)	Landfill A	45
7	TS-1 through TS-8	43
8	Landfill No. 6	42
(9)	Wastewater Lagoons	41
(9)	RB-7	41
10	Entomology Shop	39
11	Landfill B	37
12	Manzano Fire Training Area	36
13	Manzano Dump	34
(14)	Landfill C	32
(14)	RB-10	32
(15)	RL-2	30
(15)	RL-3	30
16	RB-4, RB-5, RB-6, RB-8, RB-9	23

Note: This ranking was performed according to the Hazardous Evaluation Methodology described in Appendix G. Individual site rating forms are in Appendix H.

contamination problems. Landfill No. 4 was operated as a general refuse disposal site from 1964 through 1969 and Landfill No. 2 was operated as a general refuse disposal site from 1943 through 1965. Part of the material in Landfill No. 2 was relocated in the mid-1970's to accomodate construction of the trestle test facility and this relocated waste material has been designated as Landfill No. 3. Landfills No.'s 4, 2, and 3 are closed sites with good cover. The presence of hazardous materials in these sites should be small based on the study findings. The rating scores on these three sites are No. 4 - 49, No. 2 - 47 and No. 3 - 47.

Landfill No. 6 is an active landfill and control practices prevent disposal of any significant quantities of hazardous materials at this site. The rating score for Landfill No. 6 is 42.

Landfills A, B and C and the Manzano Dump are all past sites where refuse has been dumped. No hazardous materials could be identified from records, interviews or the site inspection. The Manzano Dump has been closed with an earth cover, however, the other sites were not closed. All the sites are relatively small, five acres or less. The rating scores received by these sites are Landfill A - 45, Landfill B - 37, Landfill C - 32 and the Manzano Dump - 34.

2) Radioactive Burial Sites

a) Low-level solid radioactive wastes have been buried at three locations on Kirtland AFB (RB-11, RB-7 and RB-10 ranked in descending priority). RB-11 is a closed site located by the riding club and was used for disposal of radioactive test animals and small amounts of acids, mercury, cyanides and silver. This site is approximately 1,500 feet from a drinking water well and the ground water depth in this area may be only 50 to 60 feet (subject to confirmation). The rating score received by this site is 46.

RB-7 is a closed site in the Manzano area which was used to dispose of miscellaneous shop materials (contaminated by low level radioactivity) from the Manzano operations. The closest drinking water well is over a mile away. RB-7 received a rating score of 41.

RB-10 is an open site used for disposal of low level radioactive contaminated test animals and tissues. The site is located by the Lovelace Facility and is within 500 feet of the base boundary. The nearest active drinking water well is over three miles away and the ground-water depth in this area is believed to be about 50 feet (subject to confirmation). The RB-10 site received a rating score of 32.

b) Radioactive liquid holding tanks (RB-4, 5, 6, 8 and 9), the dirt mounds and the mine shafts appear to pose little potential for water contamination problems. RB-4, 5, 6, 8 and 9 are emergency underground holding tanks which would only receive contaminated material (low-level radioactive liquid waste) in the event of an emergency. The waste material would then be removed from the tanks and disposed of at another location. The rating score for these sites was 23.

Recent investigations of the dirt mounds and mine shafts have not detected any radiation levels above background level and no evidence has been found to indicate hazardous materials are present at these locations.

3) Fire Training Area

a) The main base fire training area (located by the FAA tower) ranks high as a potential contamination site because of the large quantity of JP-4, foam and waste chemicals that were used at the old fire training pit and the very permeable soil conditions. Fire training procedures have changed; the use of waste chemicals has been eliminated, fire training is conducted less frequently and a concrete liner has been constructed in the pit. However, the past practice have probably left chemical materials in the soil. Therefore, this site received a rating score of 50.

b) The old fire training area by Manzano has a rating score of 35 and is not considered to have as great a potential for contaminant migration as the main base fire training area. The Manzano fire training area was used less frequently than the main base site and no waste chemicals were known to be burned at the site.

4) Surface Impoundments

a) Three surface impoundments have been used for disposal of low-level radioactive wastes (RL-1, RL-2 and RL-3). RL-1, located north of DOE Area II, is a closed site and does not have a liner. RL-1 is located within 1,000 feet of a drinking water well. The ground-water level in this area is about 600 feet deep, and it is unlikely that contaminants have migrated into the ground-water system. The rating score for RL-1 is 45.

RL-2 and RL-3 are active sites located by the Lovelace facility. Both sites have liners although the liner in RL-2 may have leakage. The nearest active drinking water well is over three miles away and the ground-water depth in this area is believed to be about 50 feet (subject to confirmation). The lagoons are located approximately 1,000 feet from the base boundary. Both RL-2 and RL-3 received rating scores of 30.

b) WL-1 is a lagoon used for treatment of sanitary waste from portions of the base. The basin has a concrete liner on the side walls and an earth bottom. The lagoon should not contain any significant quantity of hazardous waste. The rating score for WL-1 is 41.

5) Training Sites

a) The potential for migration of radionuclides from the INWS training sites (TS-1 through 8) exists since the sites are located in permeable soils. Migration of radionuclides in saturated soil is unlikely due to the low rainfall and high evapotranspiration rate. The rating score for these sites is 43.

6) Entomology Shop

Waste water from the sink drains at the Entomology Shop has been discharged to a french drain outside Building 20684 since 1957. The waste water is generated by rinsing empty pesticide and herbicide containers (5-gallons or less) and rinsing and cleaning spraying equipment (hand held). The soils around and beneath the french drain are probably contaminated with waste herbicides and pesticides and the continuous addition of water into the french drain could create eventual migration of the contaminants into the ground water. The ground water in this area is approximately 600 feet deep and the nearest well is 4,000 feet away. This site received a rating score of 39.

SECTION 6

RECOMMENDATIONS

SECTION 6

RECOMMENDATIONS

In order to aid in the comparison of the thirty-one sites on Kirtland AFB with those sites identified in the IRP at other Air Force Bases, a priority ranking scale has been developed. Those sites at Kirtland AFB with overall scores greater than 60 are in the First Priority category and are sites of primary concern, based on their potential for waste migration off-site. They require further investigation in Phase II. Sites of secondary concern fall into Second Priority, with scores from 46 to 59. Further investigation for these sites is recommended. Third Priority sites (scores from 0 to 45) are sites with low potential for migration of contaminants off-site and no further monitoring is recommended unless data collected at other sites indicate a potential problem could exist at one of these sites.

The following recommendations are made to further assess the potential for contaminant migration from waste disposal areas at Kirtland AFB.

Recommendations for Phase II

First Priority

1) Monitoring for leachate generation and characterization is recommended at Landfill No. 1. Since the groundwater aquifer is quite deep in this area, it is recommended that the unsaturated zone below the landfill be monitored by installing four lysimeters around the fill (one on each side and close to the stream that traverses the site). The lysimeters should be installed at an angle to extend under the landfill. If water is detected by the lysimeter then samples should be collected and analyzed for the Interim Primary and Proposed Secondary Drinking Water Standards, Priority Pollutants, nitrite and Total Organic Carbon (see Appendix J for list of analyses).

Second Priority

1) It is recommended that the unsaturated zone be monitored beneath Landfill No.'s 2, 3 and 4 and radioactive waste burial site RB-11. The monitoring procedure should be similar to that recommended at Landfill No. 1.

2) Soil testing should be performed at the fire training area near the FAA tower. Approximately nine soil borings about 10 feet deep should be taken in a grid area of 100 feet square. A control boring sample should also be obtained in a non-contaminated area close to the fire training pit. The soil samples should be collected for analyses at three locations per boring (1, 5 and 10 feet). Analyses should consist of a water extraction and then analyses for TOC and the Interim Primary Drinking Water Standards.

Other Recommendations

1) The use of drain fields and french drains by shops and laboratories should be discontinued. These drains create soil contamination and potentially could contaminate the groundwater system.

2) Lysimeters should be installed in Landfill No. 6 while it is still active and, therefore, less expensive to install. This will provide a means of long-term monitoring of this site.

3) The base wells should be sampled and analyzed for the Interim Primary and Proposed Secondary Drinking Water Standards, Priority Pollutants, and nitrite.

APPENDIX A

PROJECT TEAM QUALIFICATIONS

J. R. Absalon, C.P.G.
D. G. Johnson
R. E. Mayfield
R. M. Reynolds, P.E.
E. J. Schroeder, P.E.

Biographical Data

JOHN R. ABSALON

Hydrogeologist

PII Redacted

[redacted]

Education

B.S. in Geology, 1973, Upsala College, East Orange, New Jersey

Professional Affiliations

Certified Professional Geologist (Indiana No. 46)
American Defense Preparedness Association
American Water Works Association
Association of Engineering Geologists
Geological Society of America
National Water Well Association

Experience Record

1973-1974 Soil Testing Incorporated-Drilling Contractors, Seymour, Connecticut. Geologist. Responsible for the planning and supervision of subsurface investigations supporting geotechnical, groundwater contamination, and mineral exploitation studies in the New England area. Also managed the office staff, drillers, and the maintenance shop.

1974-1975 William F. Loftus and Associates, Englewood Cliffs, New Jersey. Engineering Geologist. Responsible for planning and management of geotechnical investigations in the northeastern U.S. and Illinois. Other duties included formal report preparation.

1975-1978 U.S. Army Environmental Hygiene Agency, Fort McPherson, Georgia. Geologist. Responsible for performance of solid waste disposal facility siting studies, non-complying waste disposal site assessments, and groundwater monitoring programs at military installations in the southeastern U.S., Texas, and Oklahoma. Also responsible for operation and management of the soil mechanics laboratory.

1978-1980 Law Engineering Testing Company, Atlanta, Georgia. Engineering Geologist/Hydrogeologist. Responsible for project supervision of waste management, water quality assessment, geotechnical, and hydrogeologic studies at commercial, industrial, and government

John R. Absalon (Continued)

facilities. General experience included planning and management of several groundwater monitoring programs, development of remedial action programs, and formulation of waste disposal facility liner system design recommendations. Performed detailed groundwater quality investigations at Robins Air Force Base in Georgia, a paper mill in southwestern Georgia, and industrial facilities in Tennessee.

1980-Date Engineering-Science. Hydrogeologist. Responsible for supervising efforts in waste management, solid waste disposal, groundwater contamination assessment, leachate generation, and geotechnical and hydrogeologic investigations for clients in the industrial and governmental sectors.

Publications

"An Investigation of the Brunswick Formation at Roseland, New Jersey," The Bulletin, Vol. 18, No. 1, Academy of Science, State Museum, Trenton, New Jersey, 1973.

"Geologic Aspects of Waste Disposal Site Evaluations," Program and Abstracts, AEG-ASCE Symposium on Hazardous Waste Disposal, Raleigh, North Carolina, 26 April 1980.

"Practical Aspects of Groundwater Monitoring at Existing Disposal Sites," Proceedings of the EPA National Conference on Management of Uncontrolled Hazardous Waste Sites, HMCRI, Silver Springs, Maryland, 1980 (Coauthor R. C. Starr).

Biographical Data

ROGER E. MAYFIELD

Civil/Environmental Engineer

PII Redacted

[redacted]

Education

B.S. in Civil Engineering (with honors), 1976, New Mexico State University, Las Cruces, New Mexico

M.S. in Civil Engineering, 1978, New Mexico State University, Las Cruces, New Mexico

Professional Affiliations

Georgia Water Pollution Control Association
Water Pollution Control Federation
E.I.T., New Mexico (No. 2171)

Honorary Affiliations

Chi Epsilon
Tau Beta Pi

Experience Record

1972-1973 National Soils Service, Inc., Houston, Texas. Crew Chief and Strata Logger. Involved in field investigations of geological strata for foundation design and laboratory analysis of soils samples.

1976-1978 New Mexico State University, Las Cruces, New Mexico. Teaching and Research Assistant. Conducted research for various projects in the wastewater treatment field. Instructed Soil Mechanics laboratory (Junior-level, C.E.) and performed soils laboratory testing for local construction projects.

1978-Date Engineering-Science. Project Engineer. Responsible for pilot scale testing of advanced wastewater treatment technologies on textile production wastewaters. Technologies evaluated included coagulation/clarification, granular carbon adsorption, multi-media filtration, ozonation, and dissolved air flotation.

Project Engineer responsible for the performance of bench-scale treatability studies on pesticide production wastewater. Technologies tested were biological treatment, powdered activated carbon in activated sludge, and granular activated carbon adsorption.

Roger E. Mayfield (Continued)

Project Engineer in charge of coordinating on-site bench-scale biological treatability studies on a textile mill wastewater. Other technologies tested were activated carbon adsorption, chemical coagulation, aerobic digestion, vacuum filtration, and centrifugation.

Project Engineer involved in data analysis and report writing for an industry-wide survey of Advanced Wastewater Treatment (AWT) effectiveness for the textile industry.

Project Engineer involved in a detailed technical critique of a proposed hazardous waste disposal landfill design. Site soils and hydrologic conditions were examined as well as the proposed civil design. Facility design and site conditions were compared to RCRA 3004 Guidelines as well as regulations issued by several state agencies.

Project Manager of three municipal solid waste management system evaluation and upgrading projects. Objectives of projects included assessment of collection method alternatives, central baling and/or transfer systems, and potential for materials recovery.

Project Engineer on a wastewater sludge dewatering facility design project for a plastics manufacturing plant. Dewatering technology used was vacuum filtration. Responsibilities included process, hydraulic, mechanical, civil and structural design.

Project Engineer on a solid waste management study for a proposed mill for a major pulp and paper manufacturing company. Activities included estimation of production rates and characteristics of process waste streams as well as evaluation of the mill property with respect to suitability for hazardous/non-hazardous landfill siting.

Project Manager on a pilot-scale evaluation of a gravity oil/water separation unit for a peanut processing firm. Activities included on-site coordination of pilot unit operations, data evaluation and development of design criteria for a full-scale treatment facility. Project Manager on follow-up work where a detailed design for the full-scale facility was developed and start-up assistance was provided.

Project Engineer on a hazardous waste management study for a major plastics manufacturing company. Responsibilities included identification and investiagation of a number of commercial hazardous waste landfills and incinerators. Recommendations were developed concerning best

Roger E. Mayfield (Continued)

disposal alternatives based on economic, technical and regulatory considerations.

Project Manager involved in an investigation of an abandoned hazardous waste landfill site. Project objectives included definition of site geology, hydrogeology and surface hydrology. Data was collected to determine environmental impacts of site (surface and groundwater quality). Project resulted in collection of sufficient information for development of remedial action plan as well as detailed design of closure procedures. Recommendations were made on the necessary steps to secure the site.

Publications

"Expansion and Improvement of the STPDESIGN Computer Program System," M.S. Thesis, New Mexico State University, Las Cruces, New Mexico, 1978.

"State of the Air of Computer Programming in Sewage Treatment Plant Design," A.S.C.E. Conference on Computing in Civil Engineering, Atlanta, Georgia, June 1978 (Coauthors W. A. Barkley, R. D. Hill, and T. M. Shoemaker).

"Textile Industry/EPA Technical Study of July 1974 BATEA Effluent Standards," prepared for Industrial Processes Division, Industrial Environmental Research Lab, U.S. EPA, January 1980 (Coauthors, E. J. Schroeder and T. N. Sargent).

"Study of Solid Waste Management Alternatives for the City of Murray, Kentucky," prepared for Office of Solid Waste Management, U.S. EPA, Region IV, Atlanta, Georgia, October 1979.

"Technical Assistance to the City of Birmingham, Alabama," prepared for Office of Solid Waste Management, U.S. EPA, Region IV, Atlanta, Georgia, October 1980.

"Technical Assistance to the City of Aiken, South Carolina," prepared for Office of Solid Waste Management, U.S. EPA, Region IV, Atlanta, Georgia, December 1980.

Biographical Data

RANDAL M. REYNOLDS

Senior Engineer

PII Redacted

[redacted]

Education

BChE (Chemical Engineering), 1973, Georgia Institute of Technology, Atlanta, Georgia

Professional Affiliations

Registered Professional Engineer, Georgia #13023
Air Pollution Control Association
American Institute of Chemical Engineers (chapter secretary)

Experience Record

1973-1975 U.S. Environmental Protection Agency, Water Enforcement Branch, Atlanta, Georgia. Chemical Engineer. Responsible for developing draft NPDES limitations for industrial discharges, issuing public notices and final NPDES permits and participated in public hearings concerning NPDES permits.

1975-1981 Gold Kist Inc., Corporate Engineering Department, Atlanta, Georgia. Environmental Process Engineer. Responsibilities included reviewing and implementing new air quality, NPDES, RCRA and TSCA regulations. Supervised preparation and submittal of air quality, water quality and hazardous waste permit applications. Kept management informed of new regulation impacts on existing and future projects. Also provided preliminary designs for air pollution control systems and cost estimates for air quality capital projects. Developed specifications for pump systems and related unit operations.

1981-Date Engineering-Science, Inc., Atlanta, Georgia. Senior Engineer. Responsibilities include developing solid and hazardous waste disposal site studies and alternative evaluations for waste disposal methods. Provide in-plant expertise for process waste evaluations and recommendations. Provide assistance to project teams concerning industrial wastewater treatment and permitting.

RANDAL M. REYNOLDS (Continued)

Publications

R.M. Reynolds, "Practical Tips - Bagging Sludge?", Pollution Engineering, Vol. 12, No. 7, July 1980, pg. 28.

R.M. Reynolds, "Pulse-Type Fabric Filters in a Soybean Processing Facility," Operation and Maintenance of Air Particulate Control Equipment, R.A. Young, F.L. Cross, Jr., editors, Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, July 1980, pp. 121-123.

Biographical Data

ERNEST J. SCHROEDER

Environmental Engineer
Manager, Solid and Hazardous Waste

PII Redacted

[redacted]

Education

B.S. in Civil Engineering, 1966, University of Arkansas, Fayetteville, Arkansas
M.S. in Sanitary Engineering, 1967, University of Arkansas, Fayetteville, Arkansas

Professional Affiliations

Registered Professional Engineer (Arkansas No. 3259, Georgia No. 10618, Texas No. 33556 and Florida No. 0029175)
Water Pollution Control Federation

Honorary Affiliations

Chi Epsilon

Experience Record

1967-1976 Union Carbide Technical Center, Engineering Department, South Charleston, West Virginia (1967-1968). Project Engineer. Responsible for environmental protection engineering projects for various organic chemicals and plastics plants. Conducted industrial waste surveys, landfill design, and planning for plant environmental protection programs; evaluated air pollution discharges from new sources; reviewed a wastewater treatment plant design; and participated on a project team to design a new chemical unit.

Union Carbide Corporation, Environmental Protection Department, Texas City, Texas (1969-1975). Project Engineer and Engineering Supervisor. Responsible for various aspects of plant pollution abatement programs, including preparation of state and federal permits for wastewater treatment activities.

Operations Representative on $8 million regional wastewater treatment project and member of design team which made the initial site selection and process evaluation

ERNEST J. SCHROEDER (Continued)

and recommendation. Participated in contract negotiations, process and detailed engineering design, construction of the facilities, preparation of start-up manuals, operator training, and the start-up activities. Designated as Project Engineer after start-up on expansion to original waste treatment unit.

Engineering Supervisor responsible for operation of wastewater treatment facilities including collection system, sampling and monitoring programs, primary waste treatment, wastewater transfer system, biological waste treatment, and waste treatment pilot plants. Developed odor control program which successfully reduced odor emissions and represented Union Carbide at a public hearing on community odor problems.

Led special projects such as an excess loss control program to reduce water pollution losses; sewer segregation program involving coordination and reporting of 38 projects for the separation of contaminated and non-contaminated water; and sludge disposal program to develop long-term sludge disposal alternatives and recover land in present sludge landfill area. Developed improved methods of sampling and continuous monitoring of wastewater.

Union Carbide Corporation, Environmental Protection Project Engineer, Toronto, Ontario, Canada (1975-1976). Responsible for the overall environmental permitting, engineering design, construction and start-up of waste treatment systems associated with a new refinery.

1976-Date Engineering-Science, Inc., Project Manager (1976-1978). Responsible for several industrial wastewater projects including the following: wastewater investigation to characterize sources of waste streams in a chemical plant and to develop methods to reduce the wastes, sludge settling studies to evaluate settling characteristics of activated sludge at a chemical plant, development of a process document for the design and operation of a wastewater treatment facility at a petrochemical complex, wastewater treatment evaluation which included characterization of wastewater, unit process evaluation, inhibition studies, design review, operations review, preparation of operations manual, operator training and providing operating assistance for waste treatment faciltiies, various biological treatability studies and bench-scale and pilot-scale evaluation of advanced waste treatment technologies such as granular carbon adsorption, multimedia filtration, powdered activated carbon treatment, ion exchange and ozonation.

ERNEST J. SCHROEDER (Continued)

Project Manager for hazardous waste disposal projects involving waste characterization, development of criteria for disposal of hazardous waste, site investigation, preparation of permits, detailed design, construction of facilities and spill clean-up activities.

Deputy Project Manager for industry-wide pilot plant study of advanced waste treatment in the textile industry. Technologies evaluated included coagulation/clarification, multi-media filtration, granular carbon adsorption, powdered activated carbon treatment, ozonation and dissolved air flotation.

Engineering-Science, Inc., Manager of the Industrial Waste Group in the Atlanta, Georgia office (1978-1980). Responsible for the supervision of industrial waste project managers and project engineers and the management of industrial waste studies conducted in the office. Also directly involved in project management consulting with clients on environmental studies and environment assessment projects, e.g., project manager for several spill control and wastewater treatability projects and for a third-party EIS for a new phosphate mine in Florida.

Engineering-Science, Inc., Manager of Solid and Hazardous Waste Group in the Atlanta, Georgia office (1980-date). Responsible for the supervision of solid and hazardous waste project managers and project engineers and the management of solid and hazardous waste projects in the office. Project activities have included permit and regulatory assistance, waste management program development, ground water monitoring, landfill evaluations, landfill closure design, hazardous waste management, waste inventory, waste recovery/recycle evaluation, waste disposal alternative evaluation, transportation evaluation, and spill control and countermeasure planning.

Project Manager for Phase I Installation Restoration Program projects for the Department of Defense. Managed studies at two Air Force Bases to identify past hazardous waste disposal practices that could result in migration of contaminants off the base property and recommended priority sites requiring further investigation.

Project Manager for an industrial client to 1) investigate past solid waste disposal practices (including

ERNEST J. SCHROEDER (Continued)

ground water monitoring program for a landfill), 2) evaluate present waste managment practices and 3) assess future waste disposal alternatives and recommend changes to the present program (incineration, landfill, contract disposal, waste transportation and waste handling).

Publications and Presentations

Schroeder, E. J., "Filamentous Activated Sludge Treatment of Nitrogen Deficient Waste," research paper submitted in partial fulfillment of the requirements for MSCE degree, 1967.

Schroeder, E. J., and Loven, A.W., "Activated Carbon Adsorption for Textile Wastewater Pollution Control," Symposium Proceedings: Textile Industry Technology, December 1978, Williamsburg, VA.

Schroeder, E. J., "Summary Report of the BATEA Guidelines (1974) Study for the Textile Industry," North Carolina Section of AWWA/WPCA, Pinehurst, North Carolina, November 1979.

Mayfield, R. E., Sargent, T. N. and Schroeder, E. J., "Evaluation of BATEA Guidelines (1974) Textiles," U.S. EPA Report, Grant No. R-804329, February 1980.

Storey, W. A., and Schroeder, E. J., "Pilot Plant Evaluation of the 1974 BATEA Guidelines for the Textile Industry," Proceedings of the 35th Industrial Waste Conference, Purdue University, May 1980.

Pope, R. L., and Schroeder, E. J., 'Treatment of Textile Wastewaters Using Activated Sludge With Powdered Activated Carbon," U.S. EPA Report, Grant No. R-804329, December 1980.

Schroeder, E. J., "Industrial Solid Waste Management Program to Comply with RCRA," Engineering Short Course Instructor, Auburn University, October 1980.

Schroeder, E. J., "Technical and Economic Impact of RCRA on Industrial Solid Waste Management, Florida Section, American Chemical Society, May 1981.

APPENDIX B

INSTALLATION HISTORY AND

ORGANIZATIONS AND MISSIONS

APPENDIX B

INSTALLATION HISTORY

KIRTLAND AIR FORCE BASE

On January 7, 1941, almost a year before the United States entered World War II, construction began on Albuquerque Army Air Base (what is now Kirtland Air Force Base). Construction under this initial project was designed to house and supply and workspaces for 225 officers and 1,970 enlisted men. The base headquarters, along with base maintenance, operations, and housekeeping units, were located west of the extended north-south runway and tactical mission units were located east of the runway when they arrived.

The base construction project was completed by August 8, 1941. Before that time, however, the 19th Bombardment Group (BG), the base's most famous wartime resident, arrived from March Field, California. Assigned and attached to the 19BG were the 30th, 32nd, and 93rd Bombardment Squardons (BS) and the 38th Reconnaissance Squadron (RS). The 4th Air Base Group, assigned to the 19BG, preceded the flying components to Albuquerque Army Air Base, bringing with it headquarters, material, quartermaster, ordnance, and signal detachments. All four squadrons began their operations out of the new base.

Since it was the only domestic airline flying four-engine aircraft, Trans World Airlines (TWA) was selected to train pilots who would fly Consolidated B-24 bombers and other multi-engine aircraft. TWA, in turn, selected Albuquerque Army Air Base as the location for its training school because of its size, ideal flying weather, and long runways which could accommodate the B-24's. TWA's school was formally designated the Air Corps Ferry Command Four-Engine Transition School (ATFERO), but was commonly known as the Jack Frye School or simply the Four-Engine School. Using Link Trainers and B-24 training aircraft, TWA instructors trained more than 1,100 pilots and crewmen during the eight months the company operated the Four-Engine School. The Army trans-

ferred the training function from TWA on February 7, 1942, with a new designation as Combat Crew Training School. Five months later, the school was transferred from Albuquerque to a base in Tennessee.

The bombardier school, located at Barksdale Field, Louisiana, was transferred to Albuquerque in late 1941 and was activated as the Air Forces Advanced Flying School on December 24, 1941. The bombardier school remained one of Kirtland Field's most important and continuous activities for the duration of World War II. Kirtland Field also trained other students during the period 1942-1945. A school for aviation mechanics was run in conjunction with maintenance operations of the bombardier school. A navigator school also operated, although not on a scale comparable to the bombardier school.

To support the various training missions, Kirtland Field facilities expanded with hospital and club improvements during 1943. Included were additional specialized quartermaster companies, a chemical warfare company, and the 871st Military Police Company (Aviation), soon redesignated the 871st Guard Squadron.

On February 25, 1942, Albuquerque Army Air Base officially became Kirtland Field, named for Colonel Roy C. Kirtland, one of the nation's pioneer Army aviators. The base had become a significant factor not only to the military community, but to the local Albuquerque community as well. With a population of approximately 2,500 military and civilian workers, it became important to the local economy.

Kirtland Field was inactivated by the Strategic Air Command's 2nd Air Force on March 1, 1945, then transferred to the 4th Air Force and subsequently to the 15th Air Force. The military role in postwar atomic bomb development and operations was coming into focus when the mid-1946 Operation Crossroads tests at Bikini Atoll indicated a need for base support for similar tests that would follow. To provide that support, Kirtland Field was reactivated on December 1, 1946, as an installation of USAAF's Air Materiel Command.

During 1947, the Air Material Command established Kirtland Field's mission as the Army Air Forces' nuclear weapons facility. That mission involved a continuation of the wartime effort as well as adding work on ballistics, handling equipment, aircraft modification, and development tests for existing and proposed atomic bombs. At mid-year, the USAAF

also activated a seven-member (later increased to 30) Air Forces Tactical and Technical Liaison Committee at Kirtland Field.

Also important to Kirtland's future was passage of the Department of Defense Reorganization Act of 1947, which established the United States Air Force (USAF) as a separate military service replacing the U.S. Army Air Forces. Shortly thereafter, on January 13, 1948, Kirtland Field became Kirtland Air Force Base.

On May 1, 1963, the Air Force Weapons Laboratory (AFWL) was established at Kirtland to engage in weapons research and development of simulation techniques. AFWL became, and remains, one of Kirtland's major tenant organizations. During the 1960's AFWL constructed facilities to simulate nuclear effects such as transient radiation, X-rays, and electromagnetic pulses.

The most important physical change to Kirtland Air Force Base was the July 1, 1971, merger with Sandia Base. The Air Force Contract Management division (AFCMD) was transferred to Kirtland during 1972 with a mission, just as the title suggests, to manage all aspects of Air Force relations with its contractors. The 4900th Air Base Group was assigned host responsibility for the base.

By the early 1970's, Kirtland had evolved essentially into a research and development installation, hosting other military organizations as space availability dictated. Early in 1974, the Air Force Test and Evaluation Center, an independent agency, was organized at Kirtland to direct and oversee operational testing of emerging air force aircraft and systems. Shortly thereafter, during early 1976, the Aerospace Rescue and Recovery Service of Military Airlift Command moved its 1550th Aircrew Training and Test Wing (ATTW) to Kirtland from Hill Air Force Base, Utah. On July 1, 1977, the Military Airlift Command (MAC) assumed host responsibility for the base. That unit brought increased flying activity to the base, since it was responsible for all the Air Force's advanced helicopter training, using UH-1, H-3, and H-53 aircraft. In addition, the 1550ATTW conducts fixed-wing rescue and recovery training in the C-130 Hercules aircraft and is responsible for testing new helicopter systems and techniques.

SANDIA BASE

Sandia Base, located on the eastern side of Kirtland Air Force Base, has been occupied by various military and civilian organizations throughout its history. As the United States entered World War II, a training center was established for aircraft mechanics and air depot service personnel at the Albuquerque Air Depot Training Station (unofficially referred to as Sandia Base). By June 1, 1942, training was underway with new machine shops and other facilities needed to teach aircraft servicing, repair, and maintenance. By mid-1944, however, the Army Air Forces found a new use for the field. The barracks and support facilities were used as quarters for wounded pilots and aircrewmen recovering from surgery. With the former air depot station in good repair and the availability of nearby medical care, it became the Army Air Forces Convalescent Center, providing essential services and occupational therapy for approximately 800 convalescent military men.

The Convalescent Center closed during April 1945 as the need for its services dwindled, and the installation again became an Army Air Field. In that status, it began receiving the first of some 2,250 surplus military aircraft as World War II came to an end.

Sandia Base was also involved in the war effort in other ways. Sandia Corporation (now Sandia National Laboratories), its largest and most important tenant organization, played an important role in nuclear weapons development. The beginnings of Sandia Corporation go back to the later years of World War II when the highly secret Manhattan Engineer District was engaged in atomic research and development. Los Alamos Laboratory, located northwest of Santa Fe, was used for the assembly, testing and further development of atomic weapons. As atomic development progressed, Los Alamos Laboratory was responsible for assuring that the bombs were practical military weapons. To do so, considerable travel and hardware shipment was necessary. From Los Alamos, the closest runways capable of handling the heavy bombers and air transports were at Kirtland Field. Consequently, a special Manhattan District military police unit was located at Kirtland Field to guard facilities used to load Los Alamos-assembled bombs.

During this time, a new Los Alamos laboratory subgroup was organized to manage future atomic weapons development engineering and

bomb assembly. The Z Division, named for its Chief, Dr. Jerrold Zacharias, was the forerunner of Sandia Corporation. During September of 1945, Z Division assembly personnel and Los Alamos specialists moved to the laboratory facilities at "Sandia Base," the first time that name had been officially recognized.

During the immediate postwar period, Z Division managers continued work on improved bombs, assembling complete weapons from wartime components and storing the units in igloo structures located in Tijeras Arroyo, just south of Kirtland Field runways. In addition to component and shape testing, Z Division personnel participated in the first postwar field test of atomic bombs, Operation Crossroads at Bikini Atoll during July 1946.

With an increasing number of people and facilities, separation of the military functions at Sandia Base from those of Los Alamos Laboratory was desirable by mid-1946. Accordingly, Sandia Base became an ordnance activity administered by military personnel, a status it retained thereafter. At the same time separate military administration of Sandia Base was being initiated, control of Sandia Base activities was passing essentially into civilian hands. On August 1, 1946, President Truman signed into law a bill creating the Atomic Energy Commission. The Atomic Energy Commision (AEC) absorbed Manhattan Engineer District operations on December 31, 1946. Starting on January 1, 1947, the AEC began direction of the nation's nuclear weapons development program. The AEC was later designated the Energy Research and Development Administration (ERDA) and then the Department of Energy (DOE).

Military authorities also reorganized their operations at Sandia Base to discharge military functions relating to atomic energy. On January 1, 1947, the U.S. Army established Sandia as a Class II installation under control of the Armed Forces Special Weapons Project (AFSWP), an interservice organization.

Los Alamos Laboratory's Z Division was not idle while these changes were being introduced. The entire Division was consolidated at Sandia Base in early 1947. With that consolidation, Sandia Base Z Division operations included the design, manufacturing, and test capabilities that characterized its subsequent activities. Essentially an independent group working in the areas of production, stockpiling, and surveil-

lance of weapons rather than research, Z Division personnel had minimal day-to-day contact with other Los Alamos divisions. In recognition of that fact, on April 1, 1948, Z Division became the Sandia Branch of Los Alamos Scientific Laboratory.

About this time, the University of California, which operated Los Alamos Scientific Laboratory, felt that however desirable Sandia's increasing development role might be in a national defense context, that role was not an appropriate University function. Consequently, the University of California Regents asked to be relieved of their responsibility for Sandia Branch operations. After a search for industrial organizations to take over Sandia management, the AEC signed a four-year contract with the Western Electric Company to operate Sandia Corporation. Western Electric has continued its management through subsequent contracts.

Although weapons work is Sandia's prime responsibility, the techniques, facilities, and skills developed during nuclear ordnance research and development have provided a capability to support certain non-weapons projects in the national interest. Beginning in 1962, the AEC charged Sandia Corporation with investigating and evaluating the safety of nuclear power systems destined for use in space. Sandia also designed and fabricated the logic systems for Vela surveillance satellites first launched in 1963. In addition, Sandia is involved in studies of nuclear waste disposal systems, reactor safety, and radioactive material transportation problems. Sandia National Laboratories' most extensive non-weapons effort has recently been directed toward participation in the national program to develop new or improved sources of energy. Since the mid-1970's, development of solar energy processes and equipment has also been a part of Sandia activities.

On July 1, 1971, Sandia Base became the "east side" of Kirtland Air Force Base, making Sandia the largest tenant organization on base, as well as the largest Albuquerque employer, and in fact the largest single employer in New Mexico.

MANZANO BASE

Initial construction was begun on the Manzano area of Kirtland in June 1947 with final occupancy taking place in November 1949. The area

was first operated by Army personnel as an annex to Sandia Base. In 1950, Manzano Base was officially established by authority of the Armed Forces Special Weapons Project. Then in 1952, operations were transferred to the Air Force. With the merger of Kirtland AFB, Sandia Base and Manzano Base on July 1, 1971, Manzano was designated the Manzano area of Kirtland AFB.

With an increasing emphasis on protection of aerospace resources, security of the Manzano area is of prime importance to Kirtland officials. That importance is reflected in increased security, modern equipment and techniques, as well as upgrading of the base's security police organization to Group status during 1979, the only Air Force unit so designated.

G.E. PLANT

The General Electric plant, located about six miles west of Kirtland AFB, was built in 1955 by the Atomic Energy Commission. From 1955 until the Air Force bought the property in 1967, the plant produced casings for atomic bombs. General Electric now leases the facility and produces jet engine parts for both commercial and military use. Plant capacity has doubled since 1955.

LOVELACE BIOMEDICAL AND ENVIRONMENTAL INSTITUTE

Lovelace, located in the southern-most area of Kirtland AFB, was established in 1960. Its mission is toxicology research.

ORGANIZATIONS AND MISSION

The following information is taken directly from the Kirtland Air Force Base Tab A-1 Environmental Narrative.

MISSION

PRIMARY MISSION

The basic missions of Kirtland AFB are to support research and development and for training of the pararescue medics, a flying mission. Kirtland provides technical facilities, procurement and logistic support for many research and development programs and aircraft and pilot facilities including ramp space, taxiways and aircraft barrier systems for a flying training mission. In addition, many tenant organizations are supported as listed herein. The support function for the base is the 1606th Air Base Wing which contains all the administrative, security, maintenance, housekeeping, pay, medical care, housing, fire protection, legal assistance, law enforement and logistical support for the base. It was established 1 July 1977. The total base workforce of 16,600 includes tenants and 31 contractors such as General Dynamics, McDonnell-Douglas, Hughes Aircraft, Ford Aerospace and Pratt and Whitney. There are also 35 off-base units, including the Cibola National Forest, the Veterans Administration and the Secret Service.

TENANT MISSIONS

Tenants of the 1606 ABW include the following units:

AIR FORCE CONTRACT MANAGEMENT DIVISION (AFCMD)

AFCMD acts as the primary Air Force agency performing contract management functions at contractor plants, assigned by DOD to the Air Force for plant cognizance; supports program managers and buying agencies of the Government in accomplishing their missions through effective management; and continuously evaluates contractor management systems and practices to ensure their maximum effectiveness in attaining an efficient and economical operation.

The Air Force Contract Management Division (AFCMD), a part of Air Force Systems Command (AFSC), is the Air Force's systems acquisition contract management agency.

The Division has detachments at the manufacturing facilities of major U.S. contractors assigned to the Air Force under the DOD plant cognizance program. It also has a detachment at Brussels, Belgium. AFCMD has more than 3,000 military and civilian personnel assigned.

Its management responsibilities include contractor performance on projects like the F-15 and F-16 fighters, and the Space Shuttle.

Division people administer more than 30,000 contracts with a face value of over $91 billion. They provide an interface with the contractors and the AFSC system program offices, which are directly responsible for the development and acquisition of individual systems. This service is also provided in support of Army, Navy, and NASA agencies which have contracts at the plants under AFCMD surveillance.

AFCMD is also responsible for base contracting functions at Kirtland worth more than $200 million annually. Through its Kirtland Contracting Center, AFCMD provides support to the 1606th Base Wing and other base tenant organizations.

AIR FORCE WEAPONS LABORATORY (AFWL)

Mission: The AFWL has responsibilities in four mission areas: the nuclear weapons effects area which includes defining the expected nuclear environment in which Air Force systems must operate; describing the interaction and coupling of the environment with a system; identifying the system response; and, assessing the vulnerability of the system to a nuclear weapon. The Advanced Radiation Technology area includes developing high energy laser systems and investigating the application of these systems to Air Force missions. The AFWL is the Air Force focal point for nuclear weapons development and, as such, is the main Air Force interface with Department of Energy weapon development laboratories. The AFWL is also responsible for the technical aspects of nuclear safety.

Principal AFWL technical efforts today for the Air Force Systems Command are in nonconventional weapons research and development in high energy laser technology, advanced weapon concepts, and nuclear weapon technology, including nuclear survivability/vulnerablity, nuclear safety, and development of nuclear hardness criteria for Air Force systems.

The laboratory has pioneered techniques to simulate nuclear explosion effects such as radiation, shock, and electromagnetic pulse.

Data from simulation experiments continues to improve the nuclear survivability of Air Force systems, thus adding strength to the U.S. deterrence to nuclear war.

NAVAL WEAPONS EVALUATION FACILITY (NWEF)

Mission: NWEF advises Chief of Naval Operations in nuclear weapons systems safety; tests and evaluates compatibility and capability of nuclear capable aircraft and ships, surface and subsurface, with current weapons in the stockpile; assists in Board of Inspection and Survey trials of new aircraft and ships, both new and extensively overhauled, for nuclear compatibility and capability. NWEF is a field activity of the Naval Air Systems Command, which in turn is a operation division of the Naval Material Command.

NWEF was commissioned in Albuquerque in June 1949 as a U.S. Naval Air Detachment with a mission to provide specified naval aircraft with a nuclear weapons carriage and delivery capability. In 1954, the detachment was designated the Naval Air Special Weapons Facility, and in 1961 the name was changed to Naval Weapons Evaluation Facility.

DEPARTMENT OF ENERGY/ALBUQUERQUE OPERATIONS OFFICE/ALO

Mission: The Albuquerque Operations Office (ALO) of DOE conducts its mission through various contractors, and here at Kirtland primarily through the efforts of Sandia Corporation. In general terms, the primary mission includes special weapons research development, and testing. Some of these programs require large buffer zones for the protection of the health and safety of the public, and for security and operational safety. Local DOE facilities, including Sandia National Laboratories and the Los Alamos National Laboratories (LANL) - are receiving increased attention as sources for both nuclear and non-nuclear energy-related research and development.

The DOE complex includes nine major laboratory, plant, and test site facilities in eight states, extending from California to Florida.

The responsibility for the nuclear aspects of weapons research, development and testing is shared by the Los Alamos (N.M.) National Laboratory and the Lawrence Livermore Laboratory in Livermore, California. Both are operated by the University of California under contract with DOE.

Through Sandia National Laboratories here, the Albuquerque office provides ordnance engineering and other support for LANL and Livermore nuclear designs. The Albuquerque production complex manufactures test devices and weapons designed by LANL, Livermore, and Sandia National Laboratories.

The Albuquerque Operations Office supports LANL in nonweapons applications of atomic energy, such as research in the control of thermonuclear reactions for power; studies of various other energy sources; and the Clinton P. Anderson Meson Physics Facility, a medium energy, half-mile-long accelerator which will be used to study the structure of matter and in cancer research.

LANL and Sandia are involved in energy research and development projects that include the use of lasers, geothermal, solar, superconducting transmission lines, oil shale sources, and windmills.

FIELD COMMAND, DEFENSE NUCLEAR AGENCY (FCDNA)

Mission: A joint service organization tasked to provide nuclear weapons support to the Joint Chiefs of Staff, the Services, commanders of the unified and specified commands and other DOD

and government agencies. Its primary functions include nuclear weapons effects research and testing, nuclear weapons stockpile management, Technical Standardization inspections, nuclear material management and logistics support, operation of the Joint Nuclear Accident Coordinating Center, technical nuclear safety, and close liaison with the Energy Development and Research Administration.

Field Command was responsible for managing the recently completed radiological cleanup of Enewetak Atoll in the Pacific, the site of 43 nuclear test detonations between 1948 and 1958. The command also has management responsibility for Johnston Atoll in the mid-Pacific as part of the National Nuclear Test Readiness Program.

The Defense Nuclear Agency is the oldest of the defense agencies. Its history began when the "Manhattan Project," was created in 1942. The Manhattan Engineer District was dissolved by the Atomic Energy Act of 1946, which established the Armed Forces Special Weapons Project in January 1947. As the project continued its role in the formation of the nation's nuclear development program, it underwent a name change in 1959 to become the Defense Atomic Support Agency. In July 1971, its name was once more changed to Defense Nuclear Agency.

AIR FORCE TEST & EVALUATION CENTER (AFTEC)

Mission: Management of the Air Force OT&E program. As such, it designs, plans, directs, analyzes, evaluates and reports independently on major and designated nonmajor AF systems, and develop operation training and evaluation policy recommendations for Air Staff approval.

Established in 1974, the Air Force Test and Evaluation Center (AFTEC) is a separate operating agency, organizationally aligned under the Air Force Chief of Staff. AFTEC is the Air Force agency which furnishes operational test and evaluation (OT & E) information to the Air Force Chief of Staff, the Secretary of Defense, and Congress.

AFTEC is an independent test management organization responsible for providing operational assessments of evolving major systems of various types. Results of AFTEC testing are used in the acquisition decision-making process.

The 450-person center consists of a headquarters here on Kirtland, four permanently estabished detachments and approximately 28 field test teams or designated operating locations.

AFTEC is presently evaluating more than 90 major systems. Among that number are the Air Launched Cruise Missile, the over-the-horizon Backscatter radar system, the NAVSTAR Global Positioning System, the Space Transportation System (Space Shuttle), and the advanced medium range air-to-air missile (AMRAAM).

1550 AIRCREW TRAINING AND TEST WING (1550 ATTW)

Mission: Train pararescue specialists, pilots, navigators, flight mechanics, flight engineers, loadmasters, radio operators, and crew chiefs; conducts orientation courses for commanders and maintenance supervisors; provides instruction to include aerial refueling, airborne rescue command post techniques, aerial drops of cargo, personnel, and cargo-hauling; and provides specialized training in winter operations and rescue work in hard to reach areas.

The 1550th is responsible for Air Force advanced helicopter, HC-130 and pararescue training, preparing 900 pilots, navigators and other crew members each year for duty with search and rescue units in the U.S. and overseas, at Strategic Air Command missile sites, and on Tactical Air Command firing ranges.

The 1550th's flying training programs include aerial refueling of Jolly Greens by HC-130s, search and rescue command and control, air drops of cargo, and operations over the ocean and all kinds of terrain with pararescue specialists - the Air Force's famous PJs - who descend on hoist cables or parachute to reach and save survivors of aircraft crashes and other mishaps.

Important to the Wing's operations are its two maintenance squadrons. They maintain six types of aircraft and provide specialized support for sophisticated aircraft systems. The Wing's maintenance people also support other base units such as the Air Force Weapons Laboratory and all military aircraft that transit Kirtland.

In addition to training, the 1550th also tests and evaluates new techniques and equipment for search and rescue and other missions. Projects include low level air refueling procedures and use of night vision goggles for helicopter operations at night.

During the 1550th's first five years at Kirtland, its crews flew 107 rescue missions and saved 73 lives - survivors of civilian aircraft crashes, lost and injured hunters, campers, hikers, skiers and snowmobilers.

1960TH COMMUNICATIONS SQUADRON

Mission: Provides operation and maintenance of common-user communications facilities for all base units. The 1960th Communications Squadron is a unit of the Air Force Communications Command. It provides common-user and highly specialized communications-electronics for Kirtland and local Department of Defense and Department of Energy organizations.

The squadron operates and maintains the new 1A ESS electronic switching system and is the largest single telephone exchange in the Air Force. The ESS has a capacity of 14,000 lines and

serves as the main switch for Kirtland's entire telecommunications system. The system also includes over 1,200 computer data circuits, specialized alarm, alerting and conferencing systems, and numerous Autovon and federal telecommunications circuits. These provide communications with distant activities, from Enewetak Atoll in the Pacific to Washington, D.C., and European units. The squadron also maintains the 54,239 miles of cable pairs supporting the system.

The Communications Operations Branch manages and operates two telecommunications centers. The base center handles thousands of messages each day, using a Univac computer, a part of the Automatic Digital Network. A second network, using a large Honeywell computer, provides special support for the Defense Nuclear Agency and is interfaced with the Worldwide Military Command and Control System.

The Maintenance Branch services tactical and nontactical radio systems, many of which are in remote locations such as Sandia Peak and Truth or Consequences, N.M. The tactical radio workcenter provides public address system support and operates the Military Affiliate Radio System for Kirtland, in addition to installation and maintenance of tactical radio systems. The nontactical workcenter is the largest of two Air Force - maintained intrabase workcenters which support over 1,200 radios owned by Air Force and Department of Defense agencies on Kirtland.

The teletype-crypto, closed-circuit television, and weather maintenance shops support unusual requirements of the Air Force Weapons Laboratory, 1550th Aircrew Training and Test Wing, and other research and development activities. Squadron air traffic control specialists operate a precision approach radar at Albuquerque International Airport in support of the 1550th ATTW.

The Plans and Programs Branch manages the development of communications-electronics requirements, plans, improvements and modernizations. The squadron also provides communications-electronics staffs for the Weapons Laboratory, Air Force Contract Management Division, Air Force Test and Evaluation Center, and Field Command, Defense Nuclear Agency.

3098TH AVIATION DEPOT SQUADRON (AFLC)

Mission: An AFLC unit with a munitions mission in support of an AFLC logistics commitment. Its parent unit is the San Antonio Air Logistics Center at Kelly AFB, Texas.

DETACHMENT 4, 1400 MAS (MAC)

Mission: Tenant operates five T-39 aircraft to provide wartime readiness training of 75 operational and proficiency pilots assigned to units within 50 nautical miles of Kirtland AFB. The flying activity will involve seven-day, 24-hour operations.

DEFENSE CONTRACT ADMIN SERVICES OFFICE/ALBUQUERQUE

Mission: DCASO/Albuquerque (Defense Supply Agency). Administers Department of Defense contracts within the State of New Mexico and western Texas.

AIR FORCE INSPECTION & SAFETY CENTER (DET 1), NUCLEAR SURETY DIRECTORATE

Mission: Functions as OPR for all USAF matters pertaining to nuclear safety and to the inspection of nuclear weapons units, including certain non-US NATO organizations, Air Reserve Forces, and other USAF support units. Also develops and monitors Air Force policies, programs, standards, and procedures for the prevention of accidents or incidents involving nuclear weapons, nuclear reactors, radioactive materials, and ionizing radiation producing equipment.

The Directorate of Nuclear Surety on Kirtland is one of five directorates of the Air Force Inspection and Safety Center headquartered at Norton AFB, California. The directorate works closely and on a daily basis with the many members of the nuclear community on base and in the Albuqerque area.

The directorate is the focal point for management of the worldwide Air Force nuclear surety programs.

DETACHMENT 23, 17TH WEATHER SQUADRON (MAC)

Mission: Provides or arranges for meteorological support service to all activities and operations on Kirtland AFB, including those of base tenant organizations. The detachment is organized into command, administration, staff meteorology, forecasting, observing and maintenance sections.

The Base Weather Station, located in the Base Operations complex (Bldg 333) provides support to host, tenant and transient aircraft operations through observing and forecasting services. Weather advisories, severe weather warnings and special support are provided in accordance with KAFBR 55-5.

2D WEATHER SQUADRON, OPERATING LOCATION B

Mission: Specialized support to research and development efforts is provided through the detachment's staff meteorology section. Meteorologists provide this support chiefly to the Air Force Weapons Laboratory.

3416TH TECHNICAL TRAINING SQUADRON (ATC)

Mission: Supervises and operates general interest Nuclear Weapons Training courses of the Interservice Nuclear Weapons School (INWS), with a staff of about 40 people.

INWS has two distinct training missions. It is responsible for presenting the complete national nuclear weapons program from conception of weapons design, manufacturing and testing programs, to employment of weapons and weapons effects. The school also provides detailed instruction on the procedures necessary to respond to a nuclear weapon accident. Approximately 3,000 students a year from all military services and other government and nongovernment agencies receive instruction from the joint-service faculty.

The school curriculum consists of the Nuclear Weapons Orientation Advanced Course, Nuclear Emergency Team Operations Course; Nuclear Hazards Training Course; Nuclear Emergency Team Exercise Course; Senior Officers Nuclear Accident Course, and the Flag Officers Nuclear Accident Course.

MISSILE ELECTRONIC WARFARE AIRBORNE GROUP

Mission: Provides a flying electronic warfare laboratory in support of the Office of Missile Electronic Warfare (OMEW), Measurements, ECM and Support Technical Area (MESTA), Electronic Warfare Laboratory (EWL), US Army Electronics Command (USAECOM) mission.

OFFICE OF SPECIAL INVESTIGATIONS (DISTRICT 17)

Mission: Provide counterintelligence, criminal and special investigative service to Kirtland AFB activities; to collect, analyze. Report information which is pertinent to base security.

MANAGEMENT ENGINEERING TEAM (DET 25) (AFSC)

Mission: Provides Command MET services for Kirtland based AFSC units.

NUCLEAR WEAPONS TRAINING DETACHMENT

Mission: A unit of the US Army Missile and Munitions Center, Redstone Arsenal. The NWTD operates in conjunction with, and as a part of, the Interservice Nuclear Weapons School.

DEFENSE PROPERTY DISPOSAL OFFICE

Mission: Provides for the receipt, segregation, storage and shipment of excess/surplus materials and hazardous waste products. Provides for public sale of certain excess/surplus materials.

DEFENSE INVESTIGATIVE SERVICE, DISTRICT 43 (AFO)

Mission: Personnel security background investigations of Department of Defense military and civilian personnel.

PROJECT OFFICER FOR NUCLEAR MUNITIONS

Mission: Represent the US Army in the Albuquerque, Los Alamos, and San Francisco areas on matters pertaining to weapons characteristics, requirements, development, and logistics. Provides an area focal point for military exchange of information between Army, Defense Nuclear Agency, DOE and the U.S. Air Force.

AIR FORCE LOGISTICS NUCLEAR SUPPORT OFFICE (AFLC)

Mission: Liaison duties.

U.S. ARMY CORPS OF ENGINEERS/ALBUQUERQUE DISTRICT, PLANT SECTION

Mission: Provide maintenance of Albuquerque District's personnel vehicles.

AIR DEFENSE COMMAND LIAISON OFFICE (ADC)

Mission: Liaison duties.

STRATEGIC AIR COMMAND LIAISON OFFICE (SAC)

Mission: Liaison duties.

CIVIL AIR PATROL LIAISON OFFICE (USAF)

Mission: Liaison duties.

TATICAL AIR COMMAND LIAISON OFFICE (TAC)

Mission: Liaison duties.

NAVAL LIAISON OFFICE (JAWPS)

Mission: Attached to FCDNA, monitoring Naval nuclear weapon activities.

NEW MEXICO AIR NATIONAL GUARD (RESERVE)

Mission: The New Mexico Air National Guard is under Tactical Air Command assignment with A-7's assigned. Primary mission is to maintain combat readiness and world-wide deployment capability.

The New Mexico Air National Guard's 150th Tactical Fighter Group has been stationed on Kirtland since 1947. The 150th was called to active duty for the Korean War, and its pilots flew 1,413 combat missions in F-51 and F-86 aircraft. The unit won the coveted Spaatz Trophy in 1956.

The 150th was called to active duty again in 1968 and was deployed to Southeast Asia. In 15 months, the 150th flew over

6,000 combat missions in the F-100 fighter. In September 1973 the 150th began flying the A-7D Corsair II, a single-seat, single-engine tactical fighter. The unit was awarded the Winston P. Wilson Trophy in 1979 for being judged the most outstanding Air National Guard unit equipped with jet fighter-reconnaissance aircraft.

In addition to flying the close air support and interdiction missions of the A-7D, the 150th has its Defense Systems Evaluation Branch which is involved in testing Army air defense weapon systems at ranges at Fort Bliss, Texas and White Sands Missile Range, New Mexico.

156TH SUPPORT GROUP (ARMY RESERVE)

Mission: The mission of the 156th Support Group (area) until mobilization is to provide command, staff planning, control, coordination, direction and supervision over the operations, employment, administration and training of units assigned or attached.

4153RD USAR SCHOOL (ARMY RESERVE)

Mission: The mission of the US Army Reserve School is twofold: first, to provide a means whereby military personnel may attain necessary military education and proficiency through the medium of Non-resident/Resident instruction and secondly, upon mobilization the staff and faculty will augment the capability of existing Army service schools and conduct Service School and Military Occupational Specialist qualifying courses as directed.

US ARMY TRANSPONDER UNIT (WSMR)

Mission: Prepare transponder systems for AFCMD missions; provide equipment for transponder systems as prepared by the tenant when mission originates at KAFB; provide technical advice on transponder systems and installation of equipment in accordance with systems as prepared by tenant; and provides final and/or preflight inspection and checkout.

ALBUQUERQUE FREQUENCY SURVEILLANCE UNIT (WASMR)

Mission: Provides frequency surveillance and interference resolution for all federal government organizations in the Albuquerque area and acts as DOD area Albuquerque Area frequency coordinator in support of White Sands Missile Range programs.

AF OFFICE OF SECURITY POLICE

Mission: The Air Force Office of Security Police was transferred to Kirtland from Washington, D.C., in the fall of 1978. It became a separate operating agency in September 1979. The office is under the technical guidance of the Air Force Inspector General and it plans, supervises and directs all Air Force security police programs.

The office's responsibilities involved the protection of Air Force people, property, bases, mission resources, and information. It also develops standards for security police and equipment; the security of all physical and aerospace resources; information, personnel and industrial security; wartime information security; maintenance of law and order; prisoner rehabilitation and correction; vehicle traffice management; and the military working dog program.

6597 STUDENT SQUADRON (AIR FORCE SYSTEMS COMMAND)

Mission: Conducts training program of the Air Force Systems Command Noncommissioned Officers Academy.

The Air Force Systems Command NCO Academy has had over 25 years of continuous operation - longer than any Air Force NCO academy.

In January 1955 its doors were opened to the first class of students and since then 214 classes - over 16,000 NCOs - have graduated. The academy has been awarded the Air Force Outstanding Unit Award three times - in 1964, 1969, and 1977.

Emphasis in the academy's curriculum is placed on self-discipline, communicative skills, leadership principles, management techniques, human behavioral theories, group dynamics, world affairs, military justice, and Air Force history and standards.

The NCO Academy conducts four classes a year, each lasting over five weeks. Each class has 90 NCOs, the majority of whom are assigned to Air Force Systems Command organizations throughout the United States. The remaining students come from seven other major commands. In the past, Army and Navy noncommissioned officers, as well as allied NCOs from the Republic of Vietnam, have attended the academy.

In addition to the NCO Academy, the command's NCO Leadership School conducts four classes each year. Each class has 90 NCOs and is over three weeks long. These classes are designed for sergeants and staff sergeants with 4 to 15 years of service. The leadership school gives NCOs exposure to leadership approaches, management skills, effective communications, and Air Force standards, stressing an overall awareness of first-line supervisory responsibilities.

Both the NCO Academy and the NCO Leadership School are important phases of the Air Force's five-tier professional military education program offered to the NCO corps.

DET 2, 4950 TEST WING (AFSC/ASD)

Mission: Provides operations and maintenance support for the ASD aircraft performing out of KAFB--particularly the C-135 type aircraft of the AFWL Airborne Laser Laboratory and the Army Airborne Electronic Warfare Laboratory.

1369 AUDIOVISUAL SQ - DET 1

Mission: Performs standard host-base support as well as certain R&D type audiovisual support to AFSC units and AFTEC.

It is a unit of the Aerospace Audio Visual Service. The detachment operates a base audiovisual services center which provides still photographic laboratory, graphic arts, audiovisual library, and presentation services support to various Kirtland organizations.

The detachment also provides special mission motion picture and still audiovisual documentation and instrumentation photography in support of the Air Force Weapons Laboratory and other units.

The 1369th operates the audiovisual media section of the 1550th Aircrew Training and Test Wing Learning Center. Detachment 1 consists of 90 military and civilian people.

1500 CPUSS, OPERATING LOCATION AA

Mission: Performs listing, sortings, keypunch and standard data automation functions for host and tenants on Kirtland AFB.

1600 MES, DET 13

Mission: Provides Command MET services for the host and other MAC units on Kirtland AFB.

ARMY/AIR FORCE EXCHANGE SERVICE

Mission: Provides normal Base Exchange service, including retail sales and troop issue for military units in the Albuquerque vicinity.

ALBUQUERQUE SEISMOLOGICAL LABORATORY

Mission: Provides supplies and maintenance of equipment for operation of world-wide seismological stations.

U.S. CUSTOMS, AIR SUPPORT UNIT

Mission: Performs interdiction of contraband laden civilian aircraft illegally entering the U.S. between 102 degrees W. longitude and the New Mexico/Arizona boundary.

IDENTIFICATION, FRIEND, FOE OR NEUTRAL, JOINT TEST FORCE (IFFN)

Mission: Implements and conducts an evaluation program to assess command and control abilities to identify friend, foe or neutral aircraft.

SANDIA NATIONAL LABORATORIES

Mission: Sandia National Laboratories is a Department of Energy (DOE) prime contractor whose principal mission is the design of

nuclear ordnance and the innovation and investigation of advanced weapon concepts. It is the largest organization on Kirtland.

Sandia was established in 1945 to handle future weapons development engineering and assembly for the Manhattan Engineering District, the code name given the original atomic weapons project.

Sandia was operated by the University of California until 1949, when the Bell System assumed responsibility for managing the facility. Sandia Corporation was then formed as a subsidiary of Western Electric to operate the labs as a service to the U.S. government on a no-profit, no-fee basis.

Since then the labs have served as a prime contractor to the Atomic Energy Commission, Energy Research and Development Administration, and DOE. In addition to the headquarters laboratory at Albuquerque, Sandia operates a smaller laboratory at Livermore, California, and a test range near Tonopah, Nevada.

The labs are primarily concerned with national security - developing and maintaining the scientific and engineering expertise that will assure viability of the nation's nuclear ordnance; conducting research that will generate new nuclear weapon concepts; designing and developing nuclear ordnance in conjunction with other national laboratories; verifying that the weapon stockpile remains a credible deterrent through continual assessment of safety and reliability; modifying weapons as necessary to meet new requirements; and developing and applying advanced technologies to protect nuclear materials from theft.

The labs' work on nuclear ordnance - principally safing, arming, fuzing and firing systems; aerodynamics and structures - is carried out in close cooperation with DOE's other two nuclear weapons laboratories: Los Alamos Scientific Laboratory and the Lawrence Livermore Laboratory, both operated by the University of California. These two installations design the nuclear explosive systems used in the weapons.

Sandia does no actual manufacturing or assembly of weapons. This work is performed by other contractors, using design information provided by Sandia and the other weapons laboratories. Sandia is responsible, however, for assuring that each item is produced according to specifications.

Sandia is also participating in the national effort to develop new or improved sources of energy, concentrating in those areas where its experience, expertise and facilities permit a unique contribution.

One of the largest programs, an outgrowth of the labs' weapons studies of radiation effects, involves development of powerful laser and particle beams for controlled thermonuclear fusion

research. Ultimate object of this research is to determine whether laser and particle beams of sufficient energy and efficiency can be produced to fuse atoms in small fuel pellets of deuterium and tritium, creating explosions whose energy can be used to produce electric power.

Improved utilization of solar energy is being investigated by a number of labs researchers. Sandia Livermore Laboratories is providing technical management of a DOE project to develop a 10-megawatt electrical solar-power pilot plant which uses a central receiver tower. A 5-megawatt Central Receiver Solar Thermal Test Facility is used in Albuquerque to test boilers and heliostats for the 10-megawatt facility.

A Midtemperature Solar Systems Test Facility and a collector Module Test Facility are used to evaluate various collector designs and componenets for use in solar systems operating in the midtemperature range (250 to 600°F).

Sandia directs the Systems Definition Project in DOE's photovoltaic conversion program. The labs; lead roles in this area include development of photovoltaic concentrator arrays, technical management of initial system field experiments, photovoltaic cell research, and design and definition of photovoltaic power systems.

Energy projects in other fields include development of improved drill bits, development of techniques and instrumentation for recovery of fossil fuels, and research in coal liquefaction.

Sandia employs about 6,730 people at Albuquerque and 1,070 in Livermore, California, with 130 people at other locations.

LOVELACE BIOMEDICAL AND ENVIRONMENTAL INSTITUTE

Mission: In 1960, the Inhalation Toxicology Research Institute (ITRI was known as the Fission Product Inhalation Lab) was awarded an AEC contract to develop a research program to evaluate the health effects of inhaling fission product radionuclides. Construction of the facility on Kirtland AFB was completed in 1962, with numerous additions having been made since that time. ITRI now has about 200,00 sq ft of building space. ITRI mission (now under prime contract to DOE) has since expanded to include the development of experimental data that contributes to an improved understanding of the short- and long-term biological consequences of inhaling toxic material associated with various energy technologies, i.e. diesel exhaust, fibergla ., carcinogenic and transuranic radionuclides.

APPENDIX C

MISCELLANEOUS SUPPLEMENT DATA

APPENDIX C

ENVIRONMENTAL SETTING - BIOLOGICAL RESOURCES

BIOLOGICAL RESOURCES

The following information regarding biological resources found on Kirtland AFB was obtained from the Tab A-1 Environmental Narrative, revised January 1979.

Plants

The vegetation on Kirtland Air Force Base can be classified into two basic ecological associations: the Pinyon-Juniper Association and the Grassland Association. The Pinyon-Juniper association has an elevational limit of 5,800 feet, with Colorado pinyon pine and the one-seed juniper co-dominants in this association. The one-seed juniper defines the lower elevational limit of the association and is the species most common on the more exposed slopes along with scrub-oak, skunk-bush, and Gambel oak. In canyons, particularly in the higher elevations of the area, Rocky Mountain juniper can be found. This species begins to replace the one-seed juniper and becomes co-dominant with pinyon pine and ponderosa pine in the more mesic higher elevations of the canyons.

The understory in this association is dominated by grasses and shrubs. At the lower elevations the association is an open woodland with blue grama and to a lesser extent side-oats grama the principal understory species. As elevation increases, New Mexico muhly and western wheatgrass become more important understory species. In areas where the canopy cover of the pinyons and junipers becomes almost continuous, the grasses are less common and understory plants (forbs) as well as small shrubs such as creeping mahonia, Fendler bush, and mock orange become more important. The principal forbs include bitterweed and bricklebush. In the areas of densest shade, little-seed ricegrass and one small fern occur. Additional ferns, including Eaton lip fern, occur on shady granite outcroppings. Reveechon three-awn, Scribner needlegrass, noseburn, bear grass, banana yucca and paintbrush are among the more common understory plants found on the steep, rocky slopes in this area, especially on the south-facing slopes.

In areas of permanent water from springs in several of the upper canyons, small populations of aquatic or semi-aquatic plants can be found. Cattail, torrey rush, and smooth monkey flower are among the more obvious plants in this area. Arroyos and seasonally intermittent streams support other minor associations. The vegetation of these areas have higher moisture requirements than most other species in the Pinyon-Juniper Association and are generally pioneering species, principally because these areas are in a state of continual disturbance due to water erosion. The arroyos are dominated by shrubs and small trees. Narrow-leaf hop-tree, and tree-of-heaven are both common along these arroyos. The shrubs include rabbit bush, four-wing saltbush and California bricklebush. Rock jasmine, rock parsnip and Rocky Mountain sage grow in the rocky arroyo bottoms.

The Grassland Association has an upper elevational limit of 5,800 feet and extends throughout the remainder of the study area. Within this association over 50 species of grasses can be found, but only a relatively small number are abundant. Black grama, sand muhly, threeawn, Indian ricegrass, six-weeks grama, fluff grass, and spike dropseed are the most common.

Several shrubs are also common in the Grassland Association. At the lowest elevations (5,300 feet) of Kirtland, sand sage is found in very sandy soils. Winter fat grows at the higher elevations (above 5,400 feet), and may even be the dominant plant in certain areas at elevations near 5,600 feet. Another shrub, four-wing saltbush, is common throughout this association. Although grasses dominate, numerous forbs such as globe mallow, skeleton weed, thistles, Rocky Mountain zinnia, and snakeweed, as well as threadleaf groundsel, soapweed yucca and several cacti occur in the area. The cacti are more abundant than in most public land areas because these are protected from collectors and vandals. Several species of these plants, the dagger cholla, pincushion cactus, and strawberry cactus are common cacti in danger of local extinction in more accessible areas but appear to be protected here. Cane cholla and Engelmann prickly pear are two unendangered species very common in the area.

In the many arroyos of the Grassland Association vegetation is substantially different from the typical grassland vegetation. The dominant species include four-wing saltbush, Apache plume and rabbit bush. Many

introduced and native pioneering species are also common along the arroyos, including pigwees, common pruslane, six-weeks, three-awn, crownbeard, annual sunflower, stickleaf, buffalo gourd, and clammy weed. Among the most common plants are feathery fingergrass, tansy mustard, yellowcross, purple aster, golden aster, goldenweed, Russian thistle or tumbleweed, summer cypress, foxtail barley, prickly lettuce, and horse nettle. Within the Grassland Association a portion of Coyote Canyon exhibits a rather mesic vegetational composition in a small area of permanent moisture near a sulfur spring. Representative vegetation here includes many of the plants typically found in swampy areas along the Rio Grande Valley near Albuquerque such as cattails, rushes, sedges, salt-grass, foxtail barley, scratch-grass, watercress, and rabbitfoot grass. Although trees are uncommon in the Grassland Association, salt cedar, introduced from the Mediterranean region, and a native species, Fremont's cottonwood, are found at Coyote Springs.

Although the vegetation of Kirtland Air Force Base is less disturbed than in surrounding areas (no crops are commercially cultivated on base), there is still evidence of past disturbances. The most recent disturbances are mostly in the form of building projects, road construction, and development and utilization of testing facilities. These disturbances are scattered and cover a relatively small portion of the total area of Kirtland (east); however, they are more concentrated in the Grassland Association. Past disturbances are also the result of grazing previous to the incorporation of the area into Kirtland. The presence of abundant snakeweed and burro grass indicate heavy grazing of large portions of the Grassland Association at one time. It is believed that this area is still in a successional phase, since grazing was as recent as 30 years ago, and succesison proceeds at a relatively slow rate in semiarid and arid environments.

Even though there are no threatened and endangered plant species on base, several features of the study area seem to indicate that the area may be of scientific interest. For example, the "Four Hills" area provides a protected site for the developemnt of an extensive Pinyon-Juniper Association similar to that found on the east side of the Sandia-Manzano Mountain Chain. Other interesting features of the area include certain plants not normally a part of the Central New Mexico flora. For

example, dentate goldeneye, bigflowered brickle-bush, and southern morning glory are present, even common, in Sol Se Mete Canyon; these species represent northerly range extensions of normally more southerly ranging species. These species may be either relict populations or merely the northern limit of the distribution of the species.

Animals

There are no fishing streams or lakes on Kirtland AFB. Wildlife is so sparse that for the best interest of ecology, safety and security, hunting is not allowed.

The area does, however, support a variety of animal life. In view of the lack of competition from livestock, animal populations that feed on grasses and other range plants are abundant. Evidence supporting this contention is apparent in the sightings of numerous rodent burrows and mule deer, which are uncommon throughout much of the year but descend to this zone from higher elevations to winter.

Birds are the most commonly seen animal on base. In the Grassland Association, horned larks, meadowlarks, thrashers, predatory birds (hawks, owls, vultures) several species of sparrows, scaled quail, and mourning doves are the most often seen species. Scrub jays, plain titmouse, bushtits, woodpeckers of several species, and warblers occur in the Pinyon-Juniper Association as year-round residents. The species of birds seen throughout the area will vary somewhat from year-to-year due to the changing population densities of each species and climatic variability.

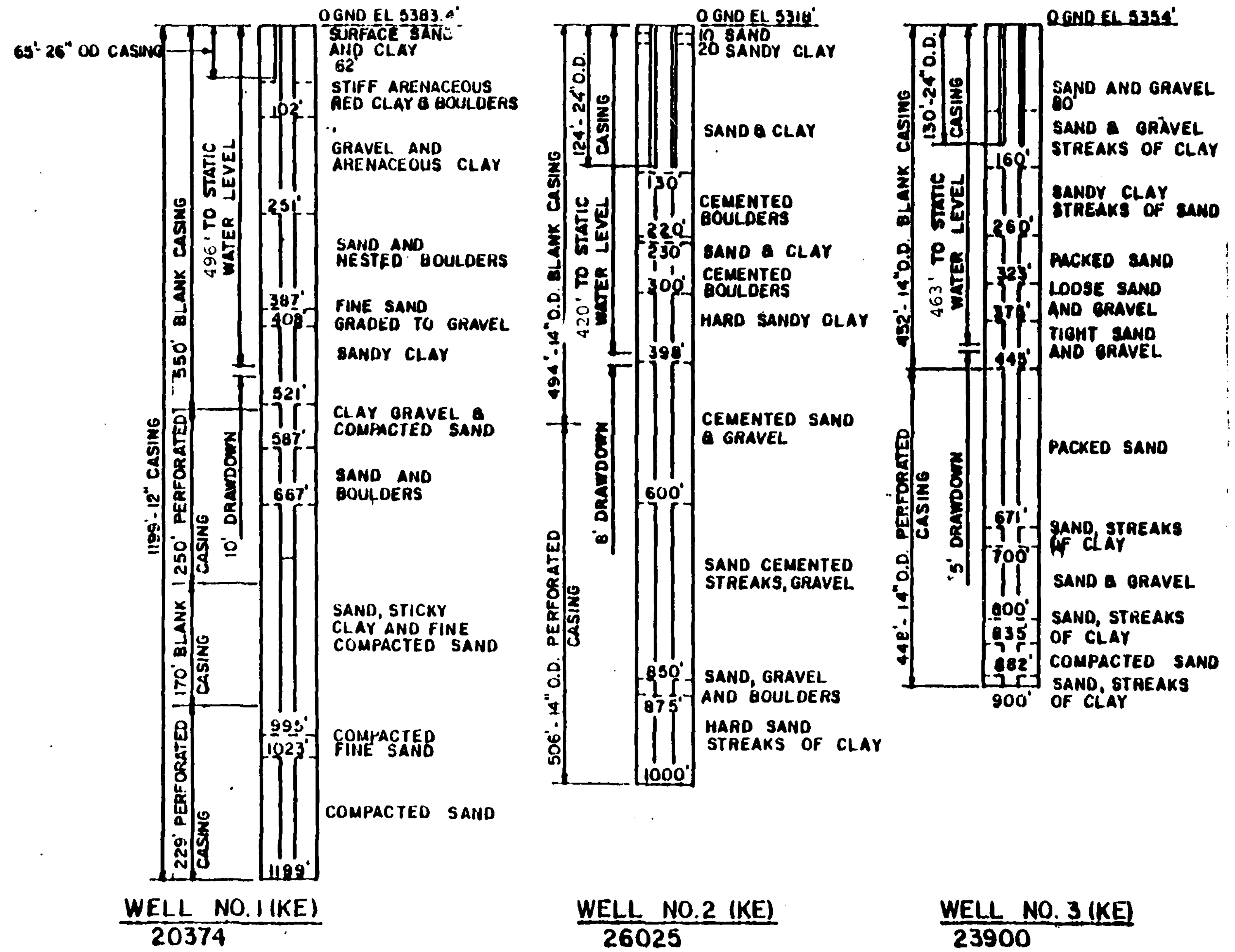
Threatened and Endangered Species

None of the wildlife listed below as being endangered on the federal list actually inhabits Kirtland AFB, but may exist within a 50-mile radius of the installation.

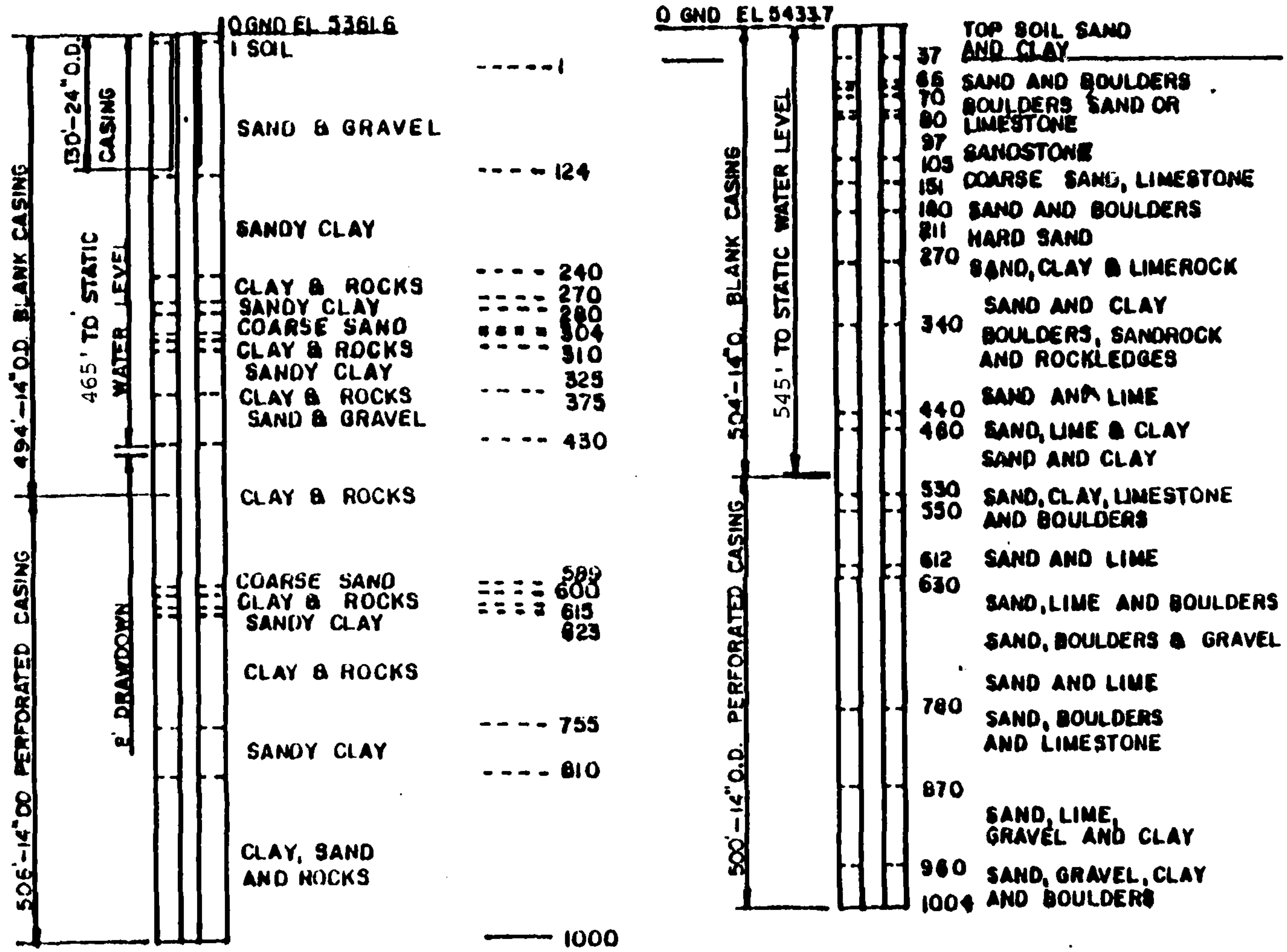
Federal Listing	State Listing
Eagle, Southern Bald	None
Falcon, American Peregrine	
Ferret, Black-footed	
Falcon, Arctic Peregrine	
Cranes, Whooping	

WELL LOGS

Logs for the wells on base follow. The quality of water derived from these wells is generally good.

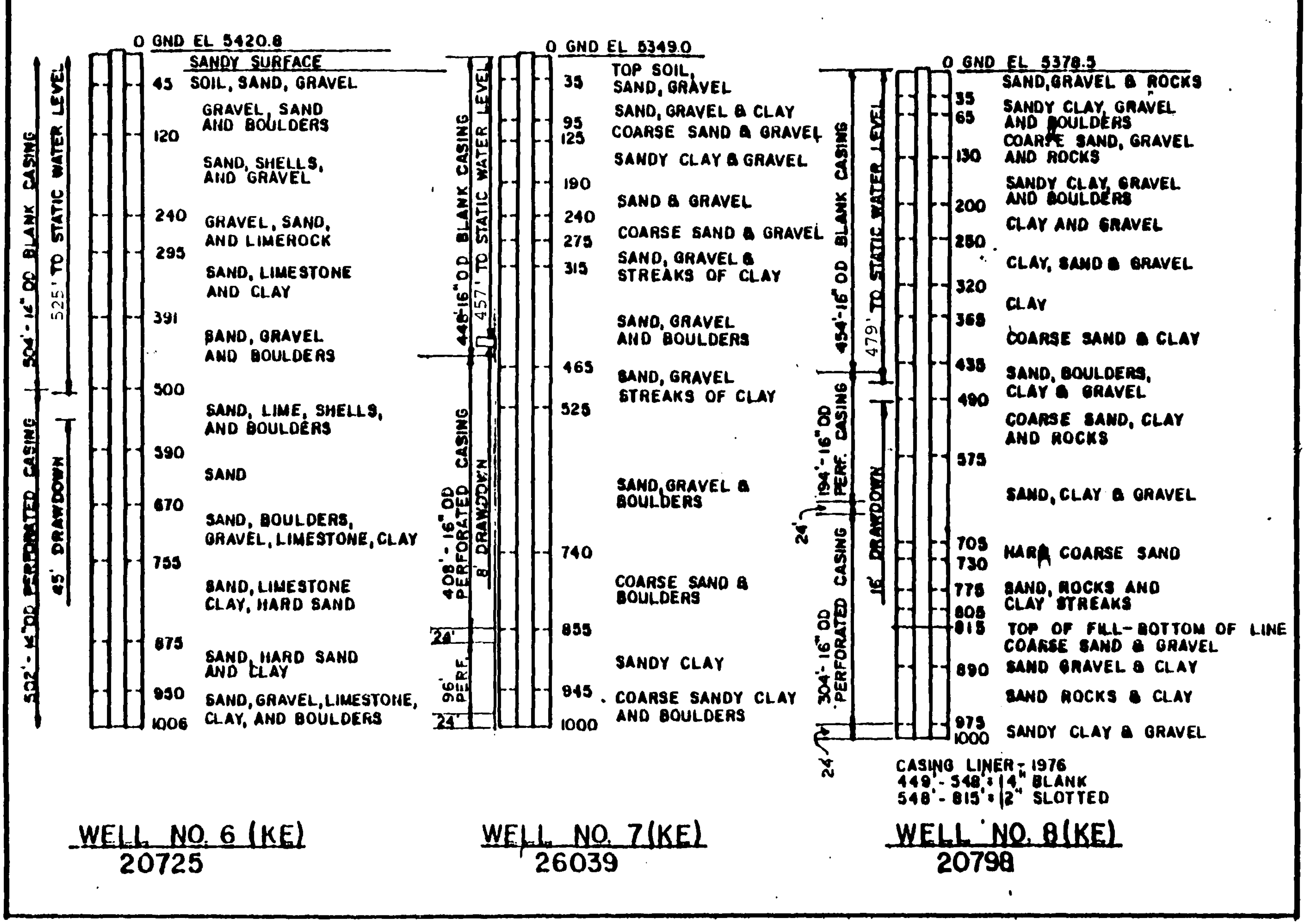


O GND EL 5383.4'
65'-26" OD CASING
SURFACE SAND AND CLAY
62
STIFF ARENACEOUS RED CLAY & BOULDERS
102'
GRAVEL AND ARENACEOUS CLAY
251'
SAND AND NESTED BOULDERS
387'
FINE SAND GRADED TO GRAVEL
408'
SANDY CLAY
521'
CLAY GRAVEL & COMPACTED SAND
587'
SAND AND BOULDERS
667'
SAND, STICKY CLAY AND FINE COMPACTED SAND
995'
COMPACTED FINE SAND
1023'
COMPACTED SAND
1199'
1199'-12" CASING
550' BLANK CASING
250' PERFORATED CASING
170' BLANK CASING
229' PERFORATED CASING
496' TO STATIC WATER LEVEL
10' DRAWDOWN
WELL NO.1 (KE)
20374
O GND EL 5318'
10 SAND
20 SANDY CLAY
SAND & CLAY
130'
CEMENTED BOULDERS
220'
230'
SAND & CLAY
CEMENTED BOULDERS
300'
HARD SANDY CLAY
398'
CEMENTED SAND & GRAVEL
600'
SAND CEMENTED STREAKS, GRAVEL
850'
SAND, GRAVEL AND BOULDERS
875'
HARD SAND STREAKS OF CLAY
1000'
124'-24" O.D. CASING
494'-14" O.D. BLANK CASING
506'-14" O.D. PERFORATED CASING
420' TO STATIC WATER LEVEL
8' DRAWDOWN
WELL NO.2 (KE)
26025
O GND EL 5354'
SAND AND GRAVEL
80'
SAND & GRAVEL STREAKS OF CLAY
160'
SANDY CLAY STREAKS OF SAND
260'
PACKED SAND
323'
LOOSE SAND AND GRAVEL
378'
TIGHT SAND AND GRAVEL
445'
PACKED SAND
671'
SAND, STREAKS OF CLAY
700'
SAND & GRAVEL
800'
SAND, STREAKS OF CLAY
835'
COMPACTED SAND
882'
SAND, STREAKS OF CLAY
900'
130'-24" O.D. CASING
452'-14" O.D. BLANK CASING
448'-14" O.D. PERFORATED CASING
463' TO STATIC WATER LEVEL
5' DRAWDOWN
WELL NO. 3 (KE)
23900

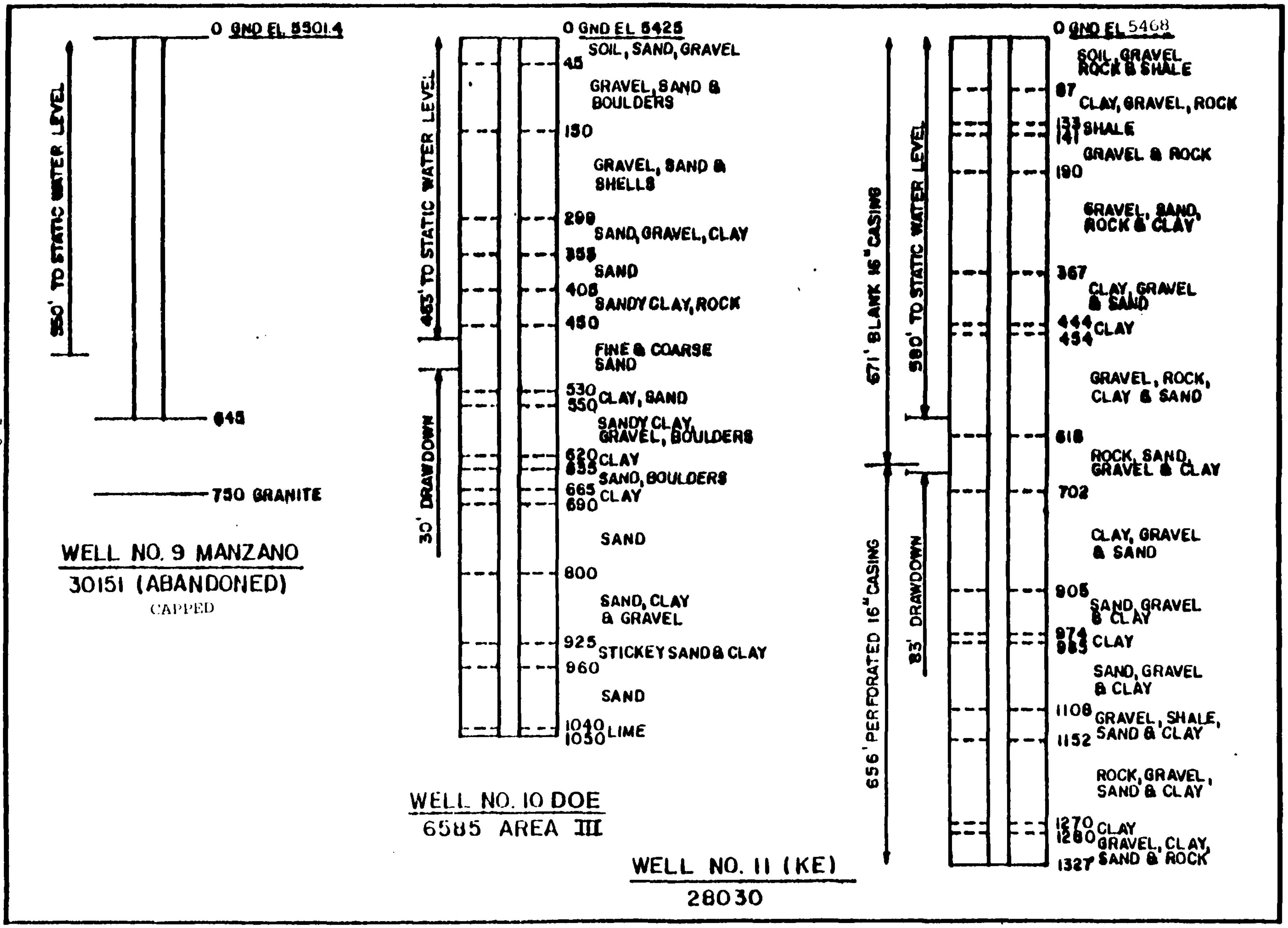


WELL NO. 4 (KE)
20550

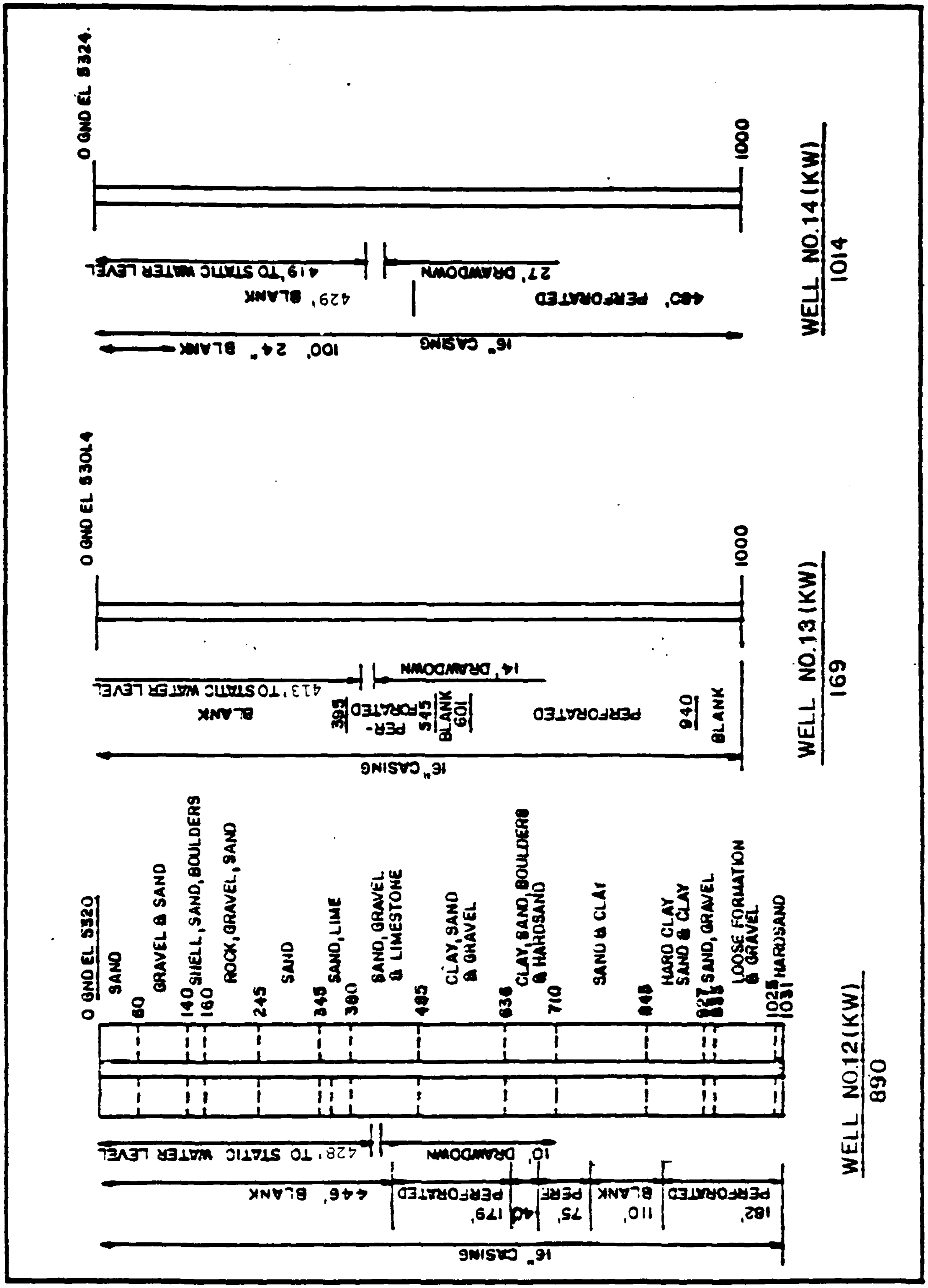
WELL NO. 5 (KE)
22999

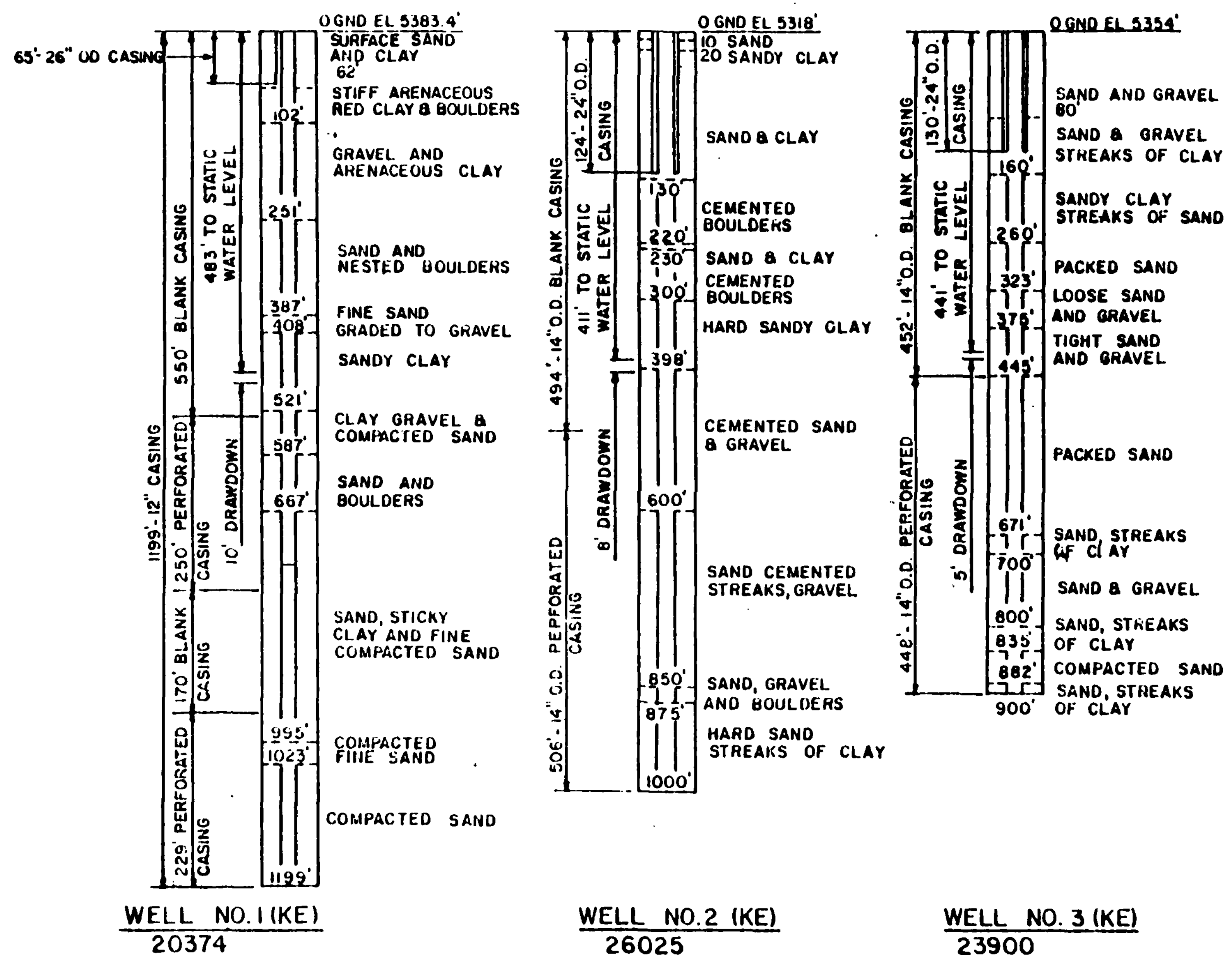


0 GND EL 5420.8
SANDY SURFACE
45 SOIL, SAND, GRAVEL
GRAVEL, SAND AND BOULDERS
120
SAND, SHELLS, AND GRAVEL
240 GRAVEL, SAND, AND LIMEROCK
295
SAND, LIMESTONE AND CLAY
391
SAND, GRAVEL AND BOULDERS
500
SAND, LIME, SHELLS, AND BOULDERS
590
SAND
670
SAND, BOULDERS, GRAVEL, LIMESTONE, CLAY
755
SAND, LIMESTONE CLAY, HARD SAND
875
SAND, HARD SAND AND CLAY
950 SAND, GRAVEL, LIMESTONE, CLAY, AND BOULDERS
1006
504'-14" OD BLANK CASING
525' TO STATIC WATER LEVEL
502'-14" OD PERFORATED CASING
45' DRAWDOWN
WELL NO. 6 (KE)
20725
0 GND EL 5349.0
35 TOP SOIL, SAND, GRAVEL
95 SAND, GRAVEL & CLAY
125 COARSE SAND & GRAVEL
SANDY CLAY & GRAVEL
190
SAND & GRAVEL
240
275 COARSE SAND & GRAVEL
315 SAND, GRAVEL & STREAKS OF CLAY
SAND, GRAVEL AND BOULDERS
465
SAND, GRAVEL STREAKS OF CLAY
525
SAND, GRAVEL & BOULDERS
740
COARSE SAND & BOULDERS
855
SANDY CLAY
945 COARSE SANDY CLAY AND BOULDERS
1000
448'-16" OD BLANK CASING
457' TO STATIC WATER LEVEL
408'-16" OD PERFORATED CASING
8' DRAWDOWN
24'
96' PERF.
24'
WELL NO. 7(KE)
26039
0 GND EL 5378.5
SAND, GRAVEL & ROCKS
35
65 SANDY CLAY, GRAVEL AND BOULDERS
COARSE SAND, GRAVEL
130 AND ROCKS
SANDY CLAY, GRAVEL AND BOULDERS
200
CLAY AND GRAVEL
250
CLAY, SAND & GRAVEL
320
CLAY
368
COARSE SAND & CLAY
435
SAND, BOULDERS, CLAY & GRAVEL
490
COARSE SAND, CLAY AND ROCKS
575
SAND, CLAY & GRAVEL
705
730 HARD COARSE SAND
775 SAND, ROCKS AND CLAY STREAKS
805
815 TOP OF FILL-BOTTOM OF LINE
COARSE SAND & GRAVEL
890 SAND GRAVEL & CLAY
SAND ROCKS & CLAY
975
1000 SANDY CLAY & GRAVEL
454'-16" OD BLANK CASING
479' TO STATIC WATER LEVEL
194'-16" OD PERF. CASING
16' DRAWDOWN
304'-16" OD PERFORATED CASING
24'
24
CASING LINER - 1976
449'-548': 14" BLANK
548'-815': 12" SLOTTED
WELL NO. 8(KE)
20798

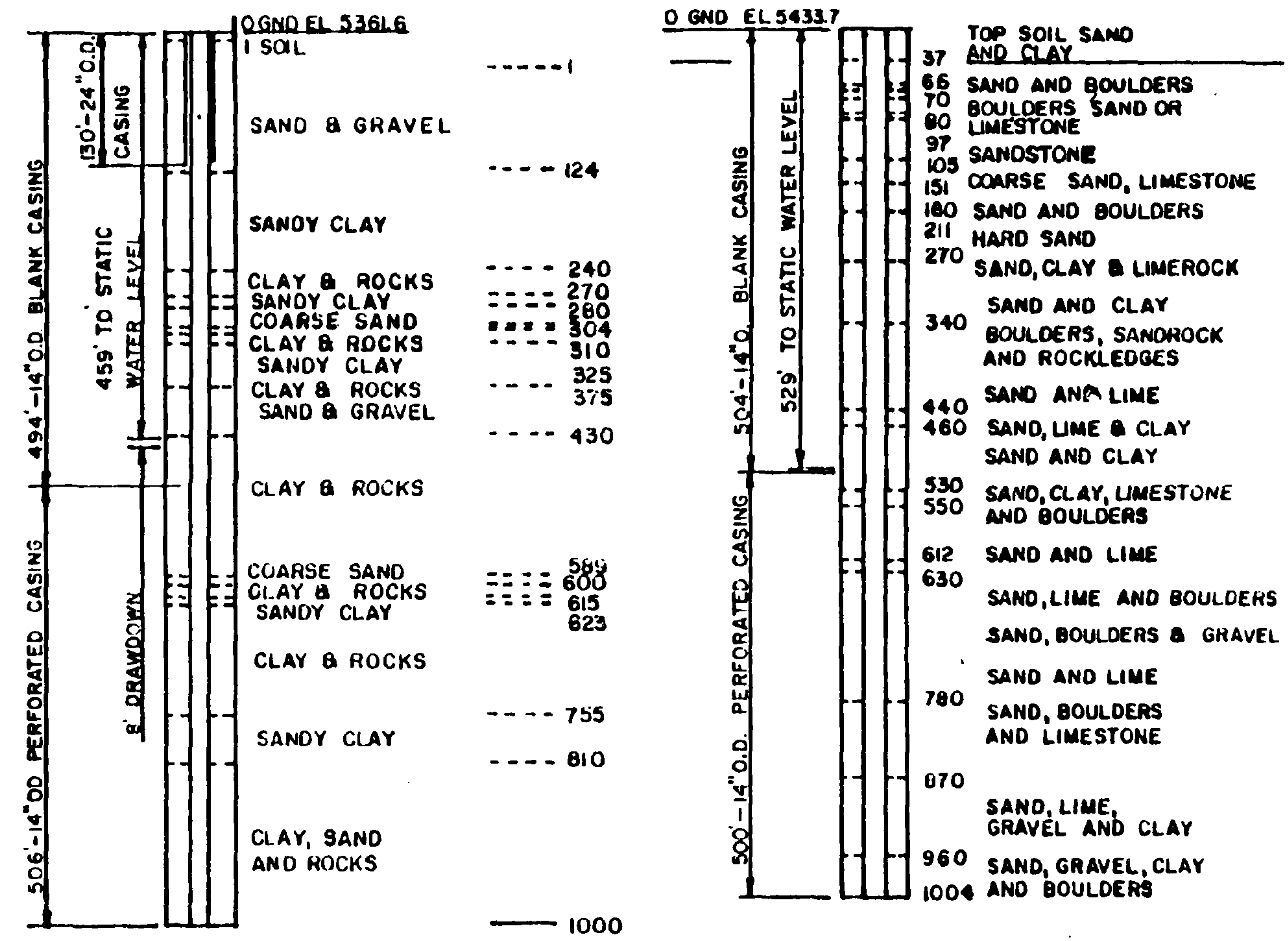


0 GND EL 5501.4
350' TO STATIC WATER LEVEL
645
750 GRANITE
WELL NO. 9 MANZANO
30151 (ABANDONED)
CAPPED
0 GND EL 5425
SOIL, SAND, GRAVEL
45
GRAVEL, SAND & BOULDERS
150
GRAVEL, SAND & SHELLS
299
SAND, GRAVEL, CLAY
355
SAND
408
SANDY CLAY, ROCK
450
FINE & COARSE SAND
530
CLAY, SAND
550
SANDY CLAY, GRAVEL, BOULDERS
620
CLAY
635
SAND, BOULDERS
665
CLAY
690
SAND
800
SAND, CLAY & GRAVEL
925
STICKEY SAND & CLAY
960
SAND
1040
LIME
1050
465' TO STATIC WATER LEVEL
30' DRAWDOWN
WELL NO. 10 DOE
6585 AREA III
0 GND EL 5468
SOIL, GRAVEL ROCK & SHALE
87
CLAY, GRAVEL, ROCK
133
SHALE
141
GRAVEL & ROCK
190
GRAVEL, SAND, ROCK & CLAY
367
CLAY, GRAVEL & SAND
444
CLAY
454
GRAVEL, ROCK, CLAY & SAND
618
ROCK, SAND, GRAVEL & CLAY
702
CLAY, GRAVEL & SAND
905
SAND, GRAVEL & CLAY
974
CLAY
985
SAND, GRAVEL & CLAY
1108
GRAVEL, SHALE, SAND & CLAY
1152
ROCK, GRAVEL, SAND & CLAY
1270
CLAY
1280
GRAVEL, CLAY, SAND & ROCK
1327
671' BLANK 16" CASING
580' TO STATIC WATER LEVEL
656' PERFORATED 16" CASING
83' DRAWDOWN
WELL NO. 11 (KE)
28030


WELL NO.14 (KW)
1014
0 GND EL 5324.
1000
419' TO STATIC WATER LEVEL
27' DRAWDOWN
429' BLANK
480' PERFORATED
100' 24" BLANK
16" CASING
WELL NO.13 (KW)
169
0 GND EL 5301.4
1000
413' TO STATIC WATER LEVEL
14' DRAWDOWN
BLANK
395
PER-FORATED
545
BLANK
601
PERFORATED
940
BLANK
16" CASING
WELL NO.12 (KW)
890
0 GND EL 5320
SAND
60
GRAVEL & SAND
140
SHELL, SAND, BOULDERS
160
ROCK, GRAVEL, SAND
245
SAND
345
SAND, LIME
380
SAND, GRAVEL & LIMESTONE
485
CLAY, SAND & GRAVEL
636
CLAY, SAND, BOULDERS & HARDSAND
710
SAND & CLAY
845
HARD CLAY SAND & CLAY
SAND, GRAVEL
LOOSE FORMATION & GRAVEL
1025
1031
HARDSAND
428' TO STATIC WATER LEVEL
10' DRAWDOWN
446' BLANK
179' PERFORATED
40
75' PERF
110' BLANK
182' PERFORATED
16" CASING

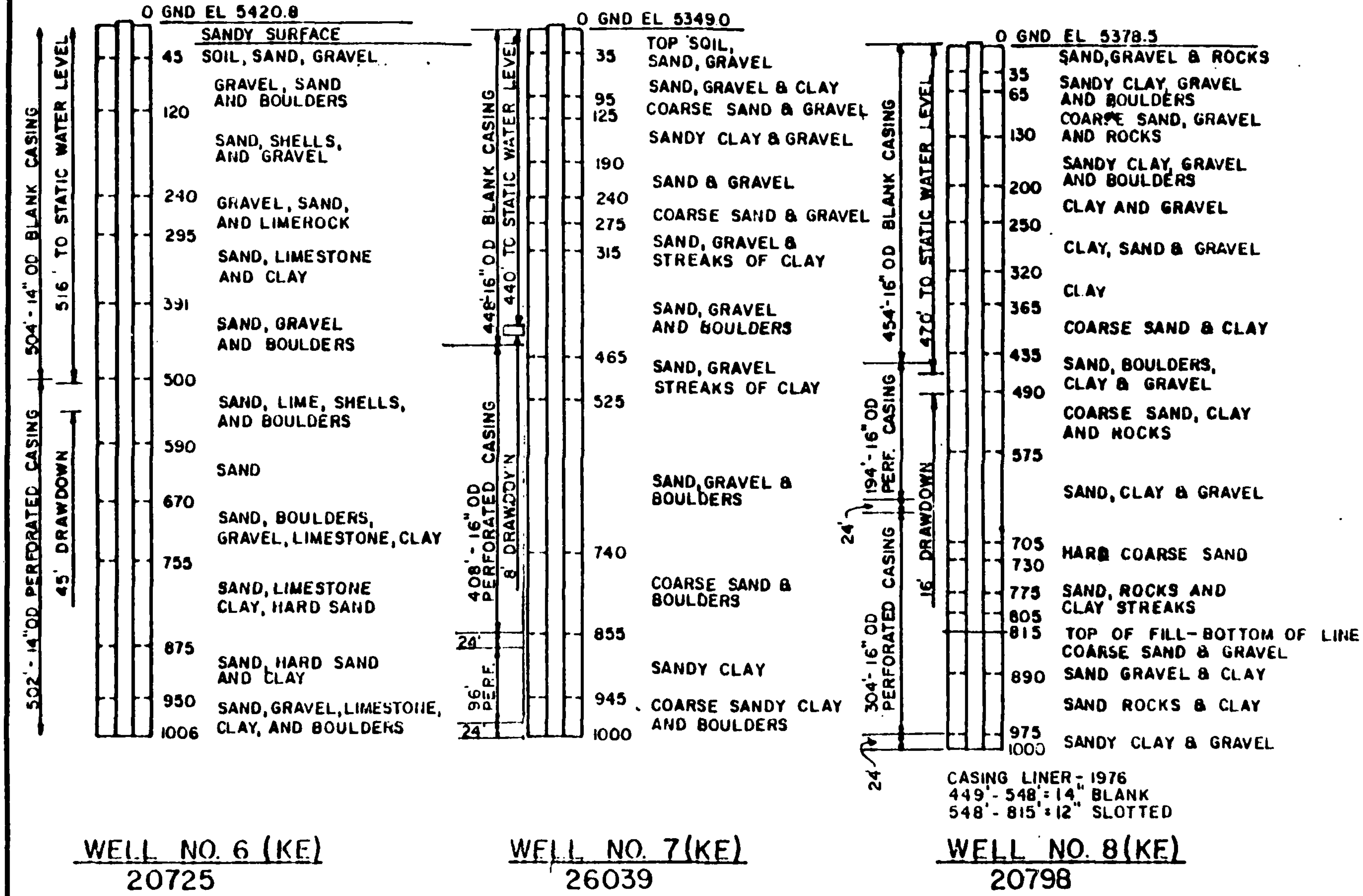


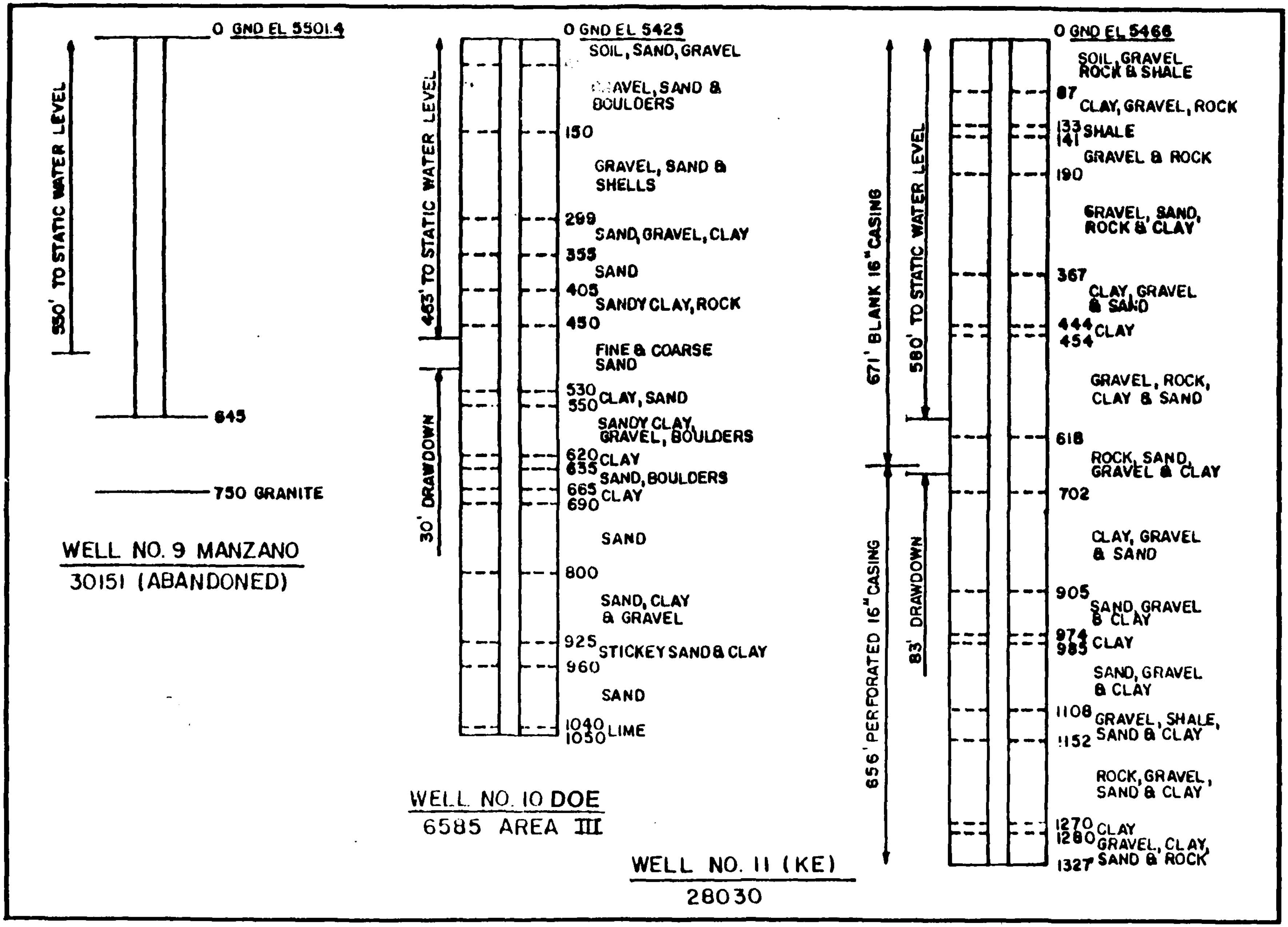
0 GND EL 5383.4'
SURFACE SAND AND CLAY
62'
65'-26" OD CASING
STIFF ARENACEOUS RED CLAY & BOULDERS
102'
GRAVEL AND ARENACEOUS CLAY
251'
SAND AND NESTED BOULDERS
387'
FINE SAND GRADED TO GRAVEL
408'
SANDY CLAY
521'
CLAY GRAVEL & COMPACTED SAND
587'
SAND AND BOULDERS
667'
SAND, STICKY CLAY AND FINE COMPACTED SAND
995'
COMPACTED FINE SAND
1023'
COMPACTED SAND
1199'
1199'-12" CASING
550' BLANK CASING
250' PERFORATED CASING
170' BLANK CASING
229' PERFORATED CASING
483' TO STATIC WATER LEVEL
10' DRAWDOWN
WELL NO.1 (KE)
20374
0 GND EL 5318'
10 SAND
20 SANDY CLAY
SAND & CLAY
124'-24" O.D. CASING
130'
CEMENTED BOULDERS
220'
230'
SAND & CLAY
CEMENTED BOULDERS
300'
HARD SANDY CLAY
398'
CEMENTED SAND & GRAVEL
600'
SAND CEMENTED STREAKS, GRAVEL
850'
SAND, GRAVEL AND BOULDERS
875'
HARD SAND STREAKS OF CLAY
1000'
494'-14" O.D. BLANK CASING
506'-14" O.D. PERFORATED CASING
411' TO STATIC WATER LEVEL
8' DRAWDOWN
WELL NO.2 (KE)
26025
0 GND EL 5354'
SAND AND GRAVEL
80'
SAND & GRAVEL STREAKS OF CLAY
130'-24" O.D. CASING
160'
SANDY CLAY STREAKS OF SAND
260'
PACKED SAND
323'
LOOSE SAND AND GRAVEL
376'
TIGHT SAND AND GRAVEL
445'
PACKED SAND
671'
SAND, STREAKS OF CLAY
700'
SAND & GRAVEL
800'
SAND, STREAKS OF CLAY
835'
COMPACTED SAND
882'
SAND, STREAKS OF CLAY
900'
452'-14" O.D. BLANK CASING
448'-14" O.D. PERFORATED CASING
441' TO STATIC WATER LEVEL
5' DRAWDOWN
WELL NO. 3 (KE)
23900

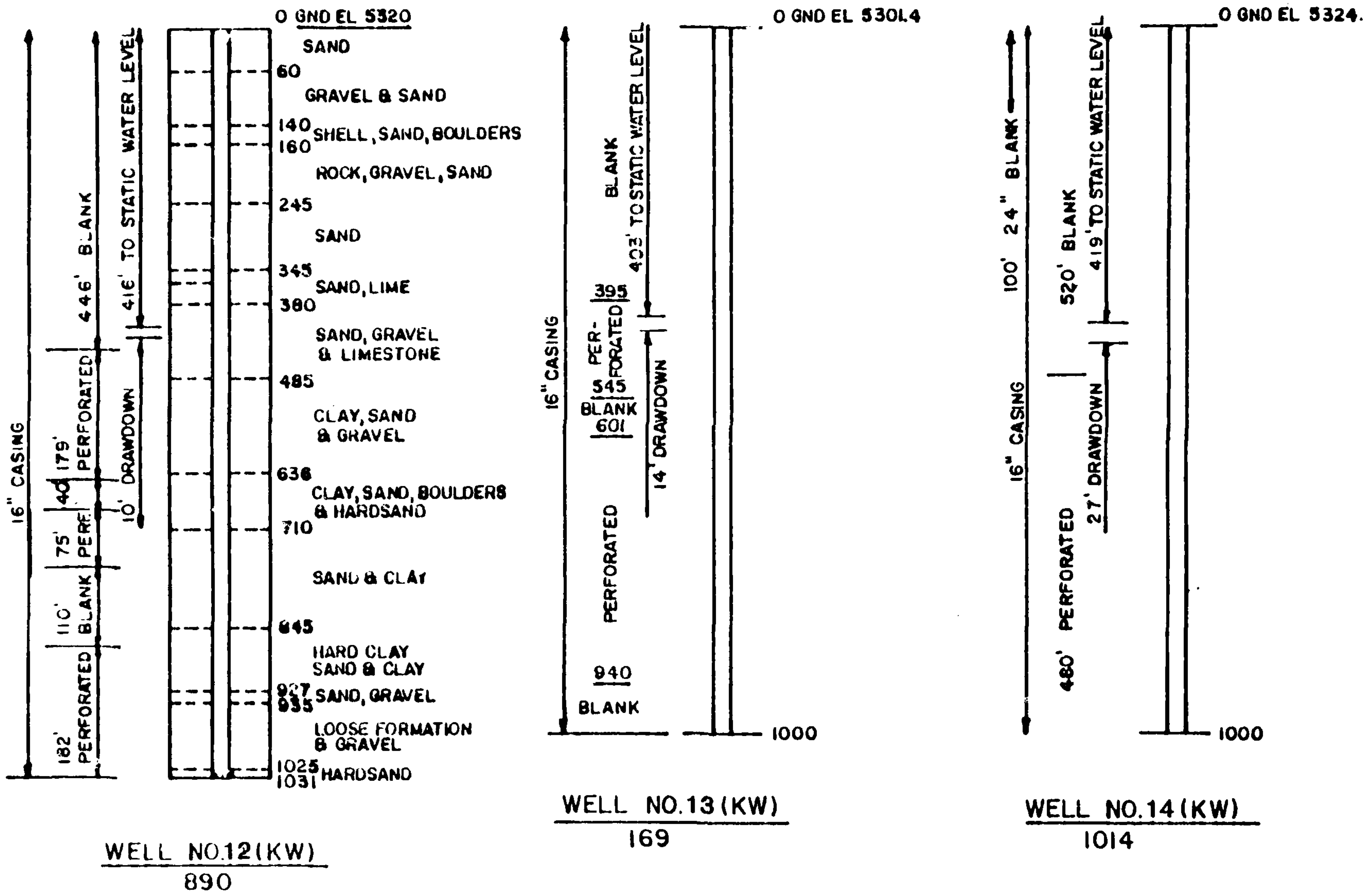


WELL NO. 4 (KE)
20550

WELL NO. 5 (KE)
22999


0 GND EL 5420.8
SANDY SURFACE
45 SOIL, SAND, GRAVEL
GRAVEL, SAND AND BOULDERS
120
SAND, SHELLS, AND GRAVEL
240 GRAVEL, SAND, AND LIMEROCK
295
SAND, LIMESTONE AND CLAY
391
SAND, GRAVEL AND BOULDERS
500
SAND, LIME, SHELLS, AND BOULDERS
590
SAND
670
SAND, BOULDERS, GRAVEL, LIMESTONE, CLAY
755
SAND, LIMESTONE CLAY, HARD SAND
875
SAND, HARD SAND AND CLAY
950 SAND, GRAVEL, LIMESTONE, CLAY, AND BOULDERS
1006
504'-14" OD BLANK CASING
516' TO STATIC WATER LEVEL
502'-14" OD PERFORATED CASING
45' DRAWDOWN
WELL NO. 6 (KE)
20725
0 GND EL 5349.0
35 TOP SOIL, SAND, GRAVEL
95 SAND, GRAVEL & CLAY
125 COARSE SAND & GRAVEL
SANDY CLAY & GRAVEL
190
SAND & GRAVEL
240
COARSE SAND & GRAVEL
275
SAND, GRAVEL & STREAKS OF CLAY
315
SAND, GRAVEL AND BOULDERS
465
SAND, GRAVEL STREAKS OF CLAY
525
SAND, GRAVEL & BOULDERS
740
COARSE SAND & BOULDERS
855
SANDY CLAY
945 COARSE SANDY CLAY AND BOULDERS
1000
448'-16" OD BLANK CASING
440' TO STATIC WATER LEVEL
408'-16" OD PERFORATED CASING
8' DRAWDOWN
24'
96' PERF.
24'
WELL NO. 7(KE)
26039
0 GND EL 5378.5
SAND, GRAVEL & ROCKS
35
65 SANDY CLAY, GRAVEL AND BOULDERS
COARSE SAND, GRAVEL
130 AND ROCKS
SANDY CLAY, GRAVEL
200 AND BOULDERS
CLAY AND GRAVEL
250
CLAY, SAND & GRAVEL
320
CLAY
365
COARSE SAND & CLAY
435 SAND, BOULDERS, CLAY & GRAVEL
490
COARSE SAND, CLAY AND ROCKS
575
SAND, CLAY & GRAVEL
705
HARD COARSE SAND
730
775 SAND, ROCKS AND CLAY STREAKS
805
815 TOP OF FILL-BOTTOM OF LINE
COARSE SAND & GRAVEL
890 SAND GRAVEL & CLAY
SAND ROCKS & CLAY
975
1000 SANDY CLAY & GRAVEL
454'-16" OD BLANK CASING
470' TO STATIC WATER LEVEL
194'-16" OD PERF. CASING
24'
16' DRAWDOWN
304'-16" OD PERFORATED CASING
24
CASING LINER - 1976
449'-548' = 14" BLANK
548'-815' = 12" SLOTTED
WELL NO. 8(KE)
20798

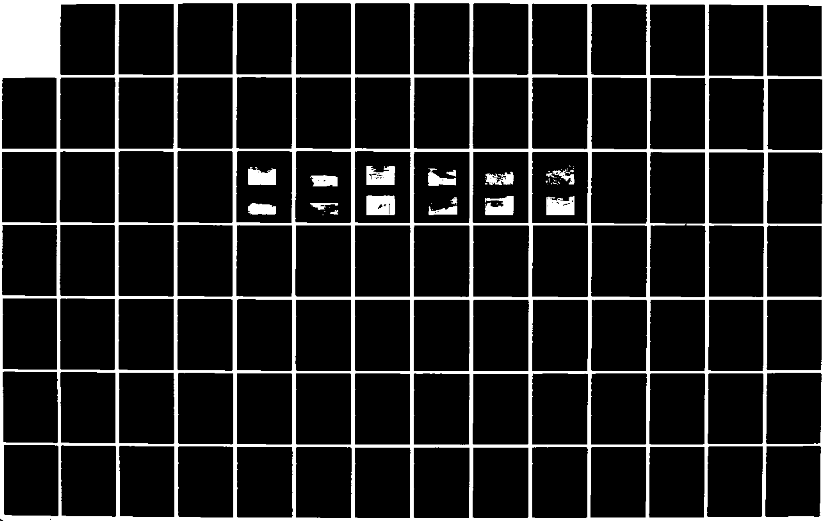

0 GND EL 5501.4
550' TO STATIC WATER LEVEL
645
750 GRANITE
WELL NO. 9 MANZANO
30151 (ABANDONED)
0 GND EL 5425
SOIL, SAND, GRAVEL
GRAVEL, SAND & BOULDERS
150
GRAVEL, SAND & SHELLS
299
SAND, GRAVEL, CLAY
355
SAND
405
SANDY CLAY, ROCK
450
FINE & COARSE SAND
530
CLAY, SAND
550
SANDY CLAY, GRAVEL, BOULDERS
620
CLAY
635
SAND, BOULDERS
665
CLAY
690
SAND
800
SAND, CLAY & GRAVEL
925
STICKEY SAND & CLAY
960
SAND
1040
LIME
1050
463' TO STATIC WATER LEVEL
30' DRAWDOWN
WELL NO. 10 DOE
6585 AREA III
0 GND EL 5466
SOIL, GRAVEL ROCK & SHALE
87
CLAY, GRAVEL, ROCK
133
SHALE
141
GRAVEL & ROCK
190
GRAVEL, SAND, ROCK & CLAY
367
CLAY, GRAVEL & SAND
444
CLAY
454
GRAVEL, ROCK, CLAY & SAND
618
ROCK, SAND, GRAVEL & CLAY
702
CLAY, GRAVEL & SAND
905
SAND, GRAVEL & CLAY
974
CLAY
985
SAND, GRAVEL & CLAY
1108
GRAVEL, SHALE, SAND & CLAY
1152
ROCK, GRAVEL, SAND & CLAY
1270
CLAY
1280
GRAVEL, CLAY, SAND & ROCK
1327
671' BLANK 16" CASING
656' PERFORATED 16" CASING
580' TO STATIC WATER LEVEL
83' DRAWDOWN
WELL NO. 11 (KE)
28030

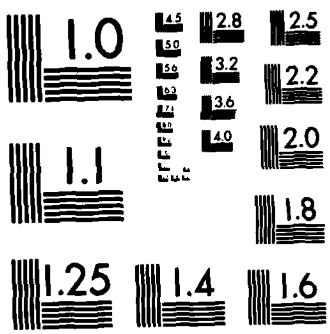


16" CASING
446' BLANK
179' PERFORATED
40'
75' PERF.
110' BLANK
182' PERFORATED
416' TO STATIC WATER LEVEL
10' DRAWDOWN
0 GND EL 5320
SAND
60
GRAVEL & SAND
140
160
SHELL, SAND, BOULDERS
ROCK, GRAVEL, SAND
245
SAND
345
SAND, LIME
380
SAND, GRAVEL & LIMESTONE
485
CLAY, SAND & GRAVEL
636
CLAY, SAND, BOULDERS & HARDSAND
710
SAND & CLAY
845
HARD CLAY SAND & CLAY
927
935
SAND, GRAVEL
LOOSE FORMATION & GRAVEL
1025
1031
HARDSAND
WELL NO.12 (KW)
890
16" CASING
BLANK
395
PER-FORATED
545
BLANK
601
PERFORATED
940
BLANK
403' TO STATIC WATER LEVEL
14' DRAWDOWN
0 GND EL 5301.4
1000
WELL NO.13 (KW)
169
100' 24" BLANK
16" CASING
520' BLANK
480' PERFORATED
419' TO STATIC WATER LEVEL
27' DRAWDOWN
0 GND EL 5324.
1000
WELL NO.14 (KW)
1014

AD-A123 312 INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH HAZARDOUS MATERIA..(U) ENGINEERING-SCIENCE INC ATLANTA GA NOV 81 F08637-80-G-0009 3/4

UNCLASSIFIED F/G 13/2 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Partial List of Pesticides and Herbicides Used at Kirtland Air Force Base

Aluminum phosphide - fumigant
Bromacil - herbicide
Carbaryl (Sevin) - insecticide
Chlordane - insecticide
Chlorpyrifos (Dursban) - insecticide
Diazinon - insecticide
Dichlorvos (DDVP) - insecticide
Malathion - insecticide
Paraquat - herbicide
Pentachlorophenol (PCP) - wood preservative
Propoxur (Baygon) - insecticide
Thiram - fungicide
Strychnine/strychnine sulfate - rodenticide
Zinc phosphide
2-4-D - herbicide

Source: Kirtland AFB Documents

APPENDIX D

MASTER LISTS OF INDUSTRIAL SHOPS AND LABS

APPENDIX D

MASTER LIST

INDUSTRIAL SHOPS AND LABORATORIES

KIRTLAND AFB

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
Air Force Weapons Laboratory (AFWL)					
*** ARAP/New Laser Concepts Branch	243	(none recorded**)	X		
NTYP/Advanced Concepts Branch	322	(none recorded**)	X		
ARAO/Advanced Resonator Optics Branch	400	(none recorded**)			
AREE/Effects & VUL Branch	400	(none recorded**)			
AREP/Pulsed Laser Systems Branch	400	(none recorded**)			
ARLO/Optical Systems Branch	405	(none recorded**)	X		
ADD/Data Conversion Branch	410	(none recorded**)			

* Treatment, storage, and/or disposal activities.
** Available records or documentation indicated no past building locations existed.
*** Office symbol

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
AFWL (cont'd)					
ADP/Computation Branch	412	(none recorded**)	X		
ARAA/Advanced Beam Control Branch	413	(none recorded**)	X		
NTEO/Test Operations Branch	413	(none recorded**)	X		
NTYC/Satellite Control COMM Branch	909	(none recorded**)	X		
ARAA/Advanced Beam Control Branch	413	(none recorded**)	X		
ARAC/Chemical Laser Branch	416	(none recorded**)	X		
ARAO/Advanced Resonator Optics Branch	416	(none recorded**)	X		
ARAP/New Laser Concepts Branch	416	(none recorded**)	X		
CA/Chief Scientist	416	(none recorded**)			
NTYP/Advanced Concepts Branch	416	(none recorded**)			
NTPB/Effects & ENV Branch	416	(none recorded**)	X		
SUE/Technical Service Division	416	(none recorded**)	X		
ARAA/Advanced Beam Control Branch	418	(none recorded**)			
ARAC/Chemical Laser Branch	418	(none recorded**)	X		

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
AFWL (cont'd)					
ARAO/Advanced Resonator Optics Branch	418	(none recorded**)	X		
ARLB/Beam Control Systems Branch	418	(none recorded**)	X		
NTYP/Advanced Concepts Branch	613	(none recorded**)	X	X	Evaporation
ARAC/Chemical Laser Branch	617	(none recorded**)	X	X	Drainage Field
NTMF/Operations Branch	618	(none recorded**)	X		
NTMF/Operations Branch	622	(none recorded**)	X	X	Drainage Field
ARLO/Optical Systems Branch	638	(none recorded**)	X		
ARAY/Advance Laser Technology Division	734	(none recorded**)	X	X	Evaporation
ARLI/All Test Operation & Immigration Branch	760	(none recorded**)	X		
ARLO/Optical Systems Branch	760	(none recorded**)	X	X	Evaporation
ARLD/Laser Devise Branch	765	(none recorded**)	X		
NTYP/Advanced Concepts Branch	909	(none recorded**)	X		
NTMD/Data and Instrumentation	914	(none recorded**)	X		

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
AFWL (cont'd)					
NTYC/Satellite COMD CON COMM Branch	914	(none recorded**)	X		
NTMF/Applications Branch	1001	(none recorded**)	X		
SUM/Technical Services Division	1010	(none recorded**)			
NTMF/Facilities Operations Branch	20560	(none recorded**)	X	X	Drummed, Storage
NTMF/Facilities Operations Branch	20797	(none recorded**)	X		
ARLO/Optical Systems Branch	30136	(none recorded**)	X	X	Drummed, pick up
NTE-CERF/Civil Engineering Research Division	57000	(none recorded**)			
SOR/Sandia Optical	66000	(none recorded**)			
1550th ATTW					
Mechanical Training Aids Shop	1001	482 to 1978			
Quality Control	1017	(none recorded**)			
Aircrew Life	1017	(none recorded**)	X	X	DPDO

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
1550 FMS					
Aerospace Ground Equipment (AGE) Repair	381	(none recorded**)	X	X	Drummed to DPDO
Precision Measurement Equipment Lab (PMEL)	325	(none recorded**)	X		
Fuels Systems	R18 (1977 to present)	1002 (to 1977)	X	X	Drummed to Fuels Management
Pneudraulics Shop	1002	(none recorded**)	X	X	Drummed to DPDO
Environmental Systems	1002	(none recorded**)			
Tire Shop	1002	(none recorded**)	X	X	Drummed to DPDO
Airborne Radio Shop	1018	(none recorded**)			
Navigation Aids-Electronic Warfare	1018	(none recorded**)			
Photo Sensors	(discontinued)	1018 (to 12/80)			
Gun Services	1017	(none recorded**)	X	X	Drummed to DPDO
Instrument Shop	1018	(none recorded**)	X		
Electric Shop	1018 (1977 to present)	1001 (to 1977)	X		
Ni Cad Battery Shop	1001 (1977 to present)	1042 (to 1977)	X		
Corrosion Control	482	(none recorded**)	X	X	Oil/Water Separator to storm sewer

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
1550 FMS (cont'd)					
Flight Line Maintenance	1001	(none recorded**)			
R&D Machine Shop	1001	(none recorded**)	X	X	Drummed to DPDO
Machine Shop	Closed	6008 (to 1981)			
277 Machine Shop	498 (1978 to present)	277 (to 1978)	X	X	Drummed to DPDO
NDI and Soap Lab	482	(none recorded**)	X	X	O/W Separ-ator to Sant. Sewer
R&D Sheet Metal Shop	1001	(none recorded**)	X		
Survival Equipment	1010	(none recorded**)	X		
Wood Shop	1001	(none recorded**)	X		
Paint Shop	1001	(none recorded**)	X	X	Storm Drainage Ditch
Welding Shop	1001	(none recorded**)	X	X	Drummed to Sandia Lab
Plating & Anodizing Shop	1001	(none recorded**)	X	X	Storm Drains
Structural Repair	1001	(none recorded**)	X		
Propulsion Branch	336	(none recorded**)	X	X	Contractor Pickup, to DPDO Oil/Water Separator to storm sewer

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
1550 FMS (cont'd)					
Bearing Shop	336	(none recorded**)	X	X	Drummed to DPDO
Jet Engine Test Cell	702	(none recorded**)	X	X	Drummed to DPDO Washings to Storm Drain
1550 OMS					
Heavy Lift H-3/ H-53	1000	(none recorded**)	X	X	Storm Drain, Drummed to DPDO
H-3 Phase Dock	1000	(none recorded**)	X	X	Storm Drain, Drummed to DPDO
H-53 Phase Dock	1000	(none recorded**)	X	X	Storm Drain, Drummed to DPDO
T-39 Section	333	(none recorded**)	X	X	Used in Process
Transient Alert Shop	333	(none recorded**)			
780 Section	1000	(none recorded**)			
AGE Nonpower Shop	1016	(none recorded**)	X	X	Drummed to DPDO
Lightlift H-1	1000	(none recorded**)	X	X	Drummed to DPDO
Initial NAV Systems	1018	(none recorded**)	X		

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
1550 OMS (cont'd)					
C-130 Maintenance	1009 (1978 to present)	1002 (1976 to 1978) (1000 to 1976)	X	X	Storm Drain, Drummed to DPDO
1606 CES					
Exterior Electric	20675	(none recorded**)			
Paint Shop	20681	(none recorded**)	X	X	Sant. Sewer Rock Bed
Carpentry Shop	20679	(none recorded**)			
Fire Extinquisher Maintenance	362	(none recorded**)	X		
Masonry Shop	20687	(none recorded**)	X		
Interior Electric	20687	(none recorded**)			
Alarm Shop	20687	(none recorded**)	X		
Refrigeration Shop	20687	(none recorded**)	X		
Plumbing Shop	20687	(none recorded**)			
Pavements Shop	20687	(none recorded**)			
Grounds Shop	20687	(none recorded**)			
Fuel Maintenance	20687	(none recorded**)	X	X	Drummed to DPDO
Heating Shop	20687	(none recorded**)	X		
Equipment Operation Shop	20687	(none recorded**)			

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
1606 CES (cont'd)					
Entomology Shop	20687	(none recorded**)	X	X	Frencl rain
Power Production	20681	(none recorded**)	X	X	Drumme ~o DPDO
Welding Shop	20680	(none recorded**)			
Water Plant	20370	(none recorded**)			
Heating Plant	Manzano Complex	(none recorded**)	X		
1606 TRANS					
Minor Maintenance	20341	(none recorded**)	X	X	Drummed to DPDO
Allied Trades Shop	20344	(none recorded**)	X	X	DPDO
Refueling Maintenance	377	(none recorded**)	X	X	Drummed to DPDO O/W Separator to San. Sewer
Wheel & Tire Shop	20348	(none recorded**)	X	X	Sump for Pump-out to DPDO
General Purpose Vehicle Maintenance	20338	(none recorded**)	X		
Heavy Equipment Shop	20423	(none recorded**)	X	X	Drummed to DPDO
Battery Shop	20423	(none recorded**)	X	X	Neutralization Sump, then to Sanitary Sewer

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
1606 TRANS (cont'd)					
Preserving, Packaging & Packing Shop	1015	(none recorded**)			
Manzano Maintenance	30142	(none recorded**)	X	X	
1606 SUPS					
Maintenance, Supply, QC & Distribution	255	(none recorded**)	X	X	Drummed to DPDO
Fuel Storage & LOX	1033	(none recorded**)	X		
ADPM/PCAM Computer Section	1010	(none recorded**)			
1606 (Miscellaneous Shops and Facilities)					
Auto Hobby Shop	20375	(none recorded**)	X	X	Drummed to DPDO
Wood Hobby Shop	20440	(none recorded**)	X		
Arts & Crafts Shop	954	(none recorded**)	X		
SP Armory	20221	(none recorded**)	X		
Reproduction	1010	(none recorded**)	X		
Small Arms Range	709	(none recorded**)	X		
USAF Hospital					
OR & Central Supply	20140	(none recorded**)			
Clinical Lab	20140	(none recorded**)	X		

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
USAF HOSPITAL (cont'd)					
Radiology	20140	(none recorded**)			
Dental Services	20140	(none recorded**)	X		
Medical Maintenance	20140	(none recorded**)			
1960 Communications Squadron (CS)					
Closed Circuit TV Maintenance	20420	(none recorded**)			
Telephone Cable Plant	20420	(none recorded**)			
Intra-Base Radio Maintenance	20420	(none recorded**)			
Teletype Maintenance	20420	(none recorded**)	X		
TAC Radio Maintenance	20420	(none recorded**)			
Crypto Maintenance	20420	(none recorded**)			
Telephone Outside Plant	20420	(none recorded**)			
3098 Aviation Depot Squadron (ADS)					
Telephone Inside Plant	20420	(none recorded**)	X		
Storage & Delivery	37507	(none recorded**)			
Munitions Handling Equipment Maintenance	37501	(none recorded**)			
Plant 3	37200	(none recorded**)	X		
Plant 4	37541	(none recorded**)	X		

INDUSTRIAL SHOPS AND LA^^RATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
New Mexico Air National Guard (ANG)					
Pneudraulics	1043	(none recorded**)	X	X	Oil/Water Separator to San. Sewer, Drummed to DPDO
Electric Shop	1043	(none recorded**)			
Egress Shop	1043	(none recorded**)	X		
Jet Engine Test Cell	1031	(none recorded**)	X	X	Oil/Water Separator
Organizational Maintenance	1043	(none recorded**)	X	X	Unknown
Carpenter Shop	1045	(none recorded**)	X		
Survival Equipment	1047	(none recorded**)	X		
Life Support	1047	(none recorded**)	X		
Weapons Shop	1043	(none recorded**)	X	X	Washrack to O/W separator to San. Sewer
AGE & Tire Shop	1051	(none recorded**)	X	X	Drummed to DPDO Oil/Water Separator to San. Sewer
Vehicle Maintenance Shop	1058	(none recorded**)	X	X	Underground tank to DPDO
Welding Shop	1046	(none recorded**)			
Machine/Sheet Metal	1047	(none recorded**)	X		

INDUSTRIAL SHOPS AND LABORATORIES (Continued)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
ANG (cont'd)					
Environmental Systems	1043	(none recorded**)			
Fuels Shop	1043	(none recorded**)	X		
Avionics Maintenance Branch	1060	(none recorded**)	X		
Photo Lab	1055	(none recorded**)	X	X	Sant. Sewer Silver Recov.
Communications Flight	1053	(none recorded**)	X		
Forms & Reproduction	1055	(none recorded**)	X		
Corrosion Control	1046	(none recorded**)	X	X	Oil/Water Separator, to San. Sewer, Drummed to DPDO
Defense Nuclear Agency (DNA)					
Printing Plant & Binding	20602	(none recorded**)	X		
Illustration Plant	20602	(none recorded**)	X		
Naval Weapons Evaluation Facility (NWEF)					
Air Frame Shop	1002	(none recorded**)	X	X	Drummed to DPDO
Grounds Support Equipment	1002	(none recorded**)	X	X	Drummed to DPDO
Paraloft AME Machine Shop	1002	(none recorded**)	X		
Armament Shop	1002	(none recorded**)	X	X	Drummed to DPDO

INDUSTRIAL SHOPS AND LABORATORIES (CONTINUED)

Name	Present Location and Dates (Bldg.No.)	Past Location and Dates (Bldg.No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Past On-Site T.S.D.*
(NWEF) (cont'd)					
Power Plant Shop	1002	(none recorded**)	X		
Electric Shop	1002	(none recorded**)	X		
Photo Lab	1002	(none recorded**)	X	X	Sant. Sewer Silver Recov.
Material Control Shop	1002	(none recorded**)			
Special Projects	1002	(none recorded**)	X		
Avionics	1002	(none recorded**)			
Photo lab	1055	(none recorded**)	X	X	Sant. Sewer Silver Recov.
Reproduction	1002	(none recorded**)	X		
Line Division	1002	(none recorded**)	X	X	Washrack to O/W Separator to Storm Sewer
Miscellaneous Units					
OL-A 1500 CSS Data Automation Shop	20604	(none recorded**)			
AFOSI Electronics & Photo	20203D	(none recorded**)	X		
DET 23, 2 Weather Squadron, Equipment & Maintenance	333	(none recorded**)			
OL-QE AFCOM Meat Department	20245	(none recorded**)			
DET. 1, 1369 AVS Photo lab	1000	(none recorded**)	X		

APPENDIX E

FACILITY DESCRIPTIONS

APPENDIX E

FACILITY DESCRIPTIONS

Industrial Shops and Laboratories

AIR FORCE WEAPONS LAB (AFWL)

ARAP/New Laser Concepts Branch, Bldg. 243. This shop performs various laser diagnostics of chemicals and mediums.

NTYP/Advanced Concepts Branch, Bldg. 322. This facility deals with technology development of imploding plasma liners and charged particle beam research.

ARAO/Advanced Resonator Optics Branch, Bldg. 400. This lab performs optical grinding for laser applications.

AREE/Effects & VUL Branch, Bldg. 400. Thsi lab performs material testing by laser beams.

AREP/Pulse Laser Systems Branch, Bldg. 400. This facility deals with pulse laser projects and electron beam system development.

ARLO/Optical Systems Branch, Bldg. 405. This facility is involved in laser experimentation. Its activities include optical lens grinding.

ADD/Data Conversion Branch, Bldg. 410. This facility provides computer support to the Air Force Weapons Lab.

ARAA/Advanced Beam Control, Bldg. 413. This facility is involved in laser optical diagnostics.

NTEO/Test Operations Branch, Bldg. 413. This lab is an instrumentation shop.

NTYC/Satellite COMD CONTROL COMM Branch, Bldg. 909. The lab deals with nuclear survivability of radiation effects testing.

ARAA/Advanced Beam Control Branch, Bldg. 413. This facility is involved in laser maintenance and laser tracking systems.

ARC/Chemical Laser Branch, Bldg. 416. This lab is involved in laser experimentation.

ARAO/Advanced Resonator Optics Branch, Bldg. 416. This facility tests thermal distortions of laser mirrors.

ARAP/New Laser Concepts Branch, Bldg. 416. This facility develops new types of lasers. It also provides physics lab facilities for chemical lasers.

CA/Chief Scientist, Bldg. 416. This facility is involved in laser experimentation.

NTYP/Advanced Concepts Branch, Bldg. 416. This lab deals with pulse power research.

NTPB/Environment & Effects Branch, Bldg. 416. This facility is involved with metal work. This lab performs numerous tests on metallic specimens.

SUE/Technical Services Division, Bldg. 416. This facility supports fabrication shops in Bldg. 1001 with machines, welding, and painting.

ARAA/Advanced Beam Control Branch, Bldg. 418. This facility deals with laser testing with helium gas.

ARAC/Chemical Laser Branch, Bldg. 418. This facility studies HF/DF lasers.

ARAO/Advanced Resonator Optics Branch, Bldg. 418. This facility tests laser mirrors.

ARLB/Beam Control Systems Branch, Bldg. 418. This facility is involved with testing the effects of atmospheric conditions on laser beams.

NTYP/Advanced Concepts Branch, Bldg. 613. This lab deals with pulsed laser research.

ARAC/Chemical Laser Branch, Bldg. 617. This facility is involved with laser experimentation.

NTMF/Facilities Operations Branch, Bldg. 622. This is a EMP facility for component testing and small missles.

ARLO/Optical Systems Branch, Bldg. 638. This lab deals with airborne diagnostics for laser testing.

ARAY, Bldg. 734. This laboratory is a laser testing facility.

ARLI/All Test Operations & Integration Branch, Bldg. 760. This area deals with maintenance, construction and testing of laser applications in aircraft.

ARLO/Optical Systems Branch,Bldg. 760. This laboratory is a laser testing area.

ARLD/Laser Devise Branch, Bldg. 765. This laboratory is a laser testing facility.

NTMD/Data and Instrumentation, Bldg.914. This laboratory tests the effects of electro-magnetic pulses on all small and medium size equipment.

NTYC/Satellite COMD CON COMM Branch, Bldg. 914. This facility tests the effects of x-rays on small and medium size equipment.

NTSA/Applications Branch, Bldg. 1001. This is the Aircraft Monitor and Control (AMAC) evaluation facility with laser aircraft involved in research and development and operation of AMAC simulation technology program and verification and validation of nuclear safety, aircraft compatibility and reliability of nuclear weapons carried aboard.

SUM/Supply Facility, Bldg. 1010. This facility provides a supply capability to the Air Force Weapons Laboratory.

NTMF/Facility Operations Branch, Bldg. 20560. This facility is known as the horizontal dipole (HPD). This facility is responsible for testing the effects of electro-magnetic pulses on large equipment.

NTMF/Facility Operations Branch. Bldg. 20797. This facility is known as the "trestle". This facility tests the effects of electro-magnetic pulses on large aircraft and its electronic systems.

ARLO/Optical Systems Branch, Bldg. 30136, Manzano Complex. This is a component processing facility. It is responsible for tearing down and building up mechanical components for airborne laser lab and grounds systems.

NTE-CERF/Civil Engineering Research division, Bldg. 57000. This lab performs research in the area of nuclear weapons simulation in air blast and ground motion shock waves.

SRO/Sandia Optical Range, Bldg. 66000. This facility is involved in development, testing and construction of various laser systems.

1550 ATTW

Mechanical Training Aids Shop, Bldg. 1001. This shop is primarily a woodworking shop involving manufacturing training aids.

Quality Control, Bldg. 1017. This shop inspects the majority of the work in the office. This shop also accesses flightline exposure required for quality maintenance inspection on helicopters and C-130's.

Aircrew Life Support Shop, Bldg. 1017. This shop is responsible for the storage and maintenance of all life support equipment including line vests, armoured vests, parachutes and flightline.

1550 FMS

AGE Repair Shop, Bldg. 381. This facility is responsible for repair and maintenance of all powered aerospace ground equipment (AGE).

Fuel Systems, Bldg. R18. This facility is responsible for maintaining the fuel systems for all base aircraft. this includes draining, sealing and repairing all fuel tanks.

Pneudraulics Shop, Bldg. 1002. This facility is responsible for maintenance and repair of all aircraft hydraulic and pneumatic systems.

Environmental Systems, Bldg. 1002. This facility is responsible for repair and routine maintenance of all aircraft environmental systems including air conditioning, heating, and oxygen pressurization.

Tire Shop, Bldg. 1002. This shop performs repairs and routine maintenance on all aircraft wheels and tires.

Airborne Radio Shop, Bldg. 1018. This shop is responsible for repair, maintenance and calibration of all radio receivers and transmitters on all assigned aircraft.

Navigational Aids - Electronic Warfare, Bldg. 1018. This shop is responsible for repair and maintenance of helicopter navigational equipment.

Photo-Sensor Shop, Bldg. 1018. This area repairs photo and photo sensor equipment including low light level TV's.

Gun Services, Bldg. 1017. This shop is responsible for removing, repairing and installing all weapons systems on H-3 and H-53 helicopters.

Instrument Shop, Bldg. 1018. This shop is responsible for repair and calibration of aircraft automatic pilot systems and related instruments.

Electric Shop, Bldg. 1018. This facility is responsible for maintenance and repair of all aircraft electrical systems.

Ni-Cad Battery Shop, Bldg. 1001. This facility is responsible for maintenance, charging, inspection and servicing of Ni-Cad battery units.

Corrosion Control, Bldg 482. This shop treats aircraft for prevention of rust and other corrosion processes. This facility also is responsible for the aircraft wash rack facility.

Flightline Maintenance, Bldg. 1001. This facility is responsible for manufacture and repair of parts for aircraft and ground equipment.

277 Machine Shop, Bldg. 498. This facility is involved in the manufacture and reproduction of parts for the Air Force Weapons Lab.

R&D Sheet Metal Shop, Bldg. 1001. This facility is responsible for sheet metal work and projects associated with the Air Force Weapons Lab.

Survival Equipment, Bldg. 1010. This facility is responsible for packing survival equipment including parachutes, survival clothing and rubber rafts.

Wood Shop, Bldg. 1001. This shop is responsible for all aspects of carpentry work.

Paint Shop, Bldg. 1001. This shop is responsible for application of protective coatings to Air Force Weapons Lab and other research and development objects.

R&D Machine Shop, Bldg. 1001. This facility is involved with fabrication of metal items used in research and development work.

Welding Shop, Bldg. 1001. This facility provides routine welding service to Air Force Weapons Lab and other R&D projects.

Plating & Anodizing Shop, Bldg. 1001. This facility plates and anodizes small R&S items.

Structural Repair, Bldg. 1001. This shop performs surface repairs on aircraft components.

Propulsion Branch, Bldg. 336. This facility is responsible for the maintenance and repair of jet engines on the base.

Propulsion-Bearings Shop, Bldg. 336. This shop is responsible for maintenance and repair of jet engines anti-friction bearings.

Jet Engine Test Cell, Bldg. 702. This facility is responsible for draining jet engine fuel and hydraulic lines, replacement of all engine fluids and testing engine performance.

1550 OMS

Heavy Lift, H-3/H-53, Bldg. 1000. This facility is primarily responsible for pre-flight and non-scheduled maintenance as well as launch recovery maintenance requirements on H-3 and H-53 helicopters.

H-3/H-53 Phase dock, Bldg. 1000. These facilities are responsible for complete phase inspection of the functional systems for the helicopters after 150 hours of operation.

T-39 Section, Bldg. 333. This facility is responsible for general operation maintenance on five T-39 aircraft.

Transient Alert Shop, bldg. 333. This facility is responsible for recovery and launching of all transient aircraft including fueling, quick systems check and crash recovery maintenance.

780 Section, Bldg. 1000. This facility is responsible for inventory of aircraft.

AGE Nonpower Shop, Bldg. 1016. This facility is responsible for maintaining and servicing of all carts, trailers, hydraulic jacks and other nonpower AGE equipment.

Flightlift H-1, Bldg. 1000. This facility is responsible for all unscheduled maintenance including wash rack service for H-1 helicopters.

Inert Navagational Systems, Bldg. 1018. This facility maintains Doppler, and radar system maintenance for helicopters and C-130's.

C-130 Maintenance, Bldg. 1009. This shop is responsible for performing pre-flight, through-flight and home station maintenance on all C-130 aircraft.

1660 CES

Fuels Maintenance Shop, Bldg. 20687. this facility is responsible for maintenance of fuel stands on the flightline used for aircraft refueling. This facility is also responsible for inspection of fuels and petroleum products storage tanks.

Heating Shop, Bldg. 20687. This facility is responsible for maintaining the heat facilities on base.

Equipment Operations Shop, Bldg. 20687. This shop is responsible for maintenance and repair of all heavy equipment on base including bulldozers, dump trucks, road grading equipment and other assigned vehicles.

Entomology Shop, Bldg. 20687. This shop is responsible for control of insect-type pests for the entire base.

Power Production Shop, Bldg. 20681. This facility is responsible for maintenance and operation of all standby generators on the base. Also, servicing and repair of lead acid batteries is accomplished by this shop.

Welding Shop, Bldg. 20680. This shop forms sheet metal and welding work for all of the Civil Engineering Squadron.

Water Plant, Bldg. 20370. This facility is responsible for servicing and maintaining adequate water supply to the base. Its responsibilities include repair and maintenance of 12 water supply wells on base.

Heating Plant, Manzano Complex. This shop is responsible for maintaining the heating systems of the Manzano Complex.

Exterior Electric Shop, Bldg. 20675. This facility is responsible for installation electric power lines and transformers for the base complexes.

Paint Shop, Bldg. 20681. This shop is responsible for applying all-weather coatings to building and to provide signs for the base.

Carpentry Shop, Bldg. 20679. This shop provides woodworking and carpentry services for all buildings on base.

Fire Extinguisher Maintenance, Bldg. 362. This facility is responsible for repair and maintenance and charging of all base fire extinguishers except aircraft units.

Masonry Shop, Bldg. 20687. This shop is responsible for repair and maintenance and installation of all cement and concrete structures including brick floor tile and cement blocks.

Interior Electric Shop, Bldg. 20687. This shop is responsible for maintaining all electrical wiring and wiring systems for base hangars, housing, and shops.

Alarm Shop, Bldg. 20687. The Alarm Shop is responsible for installing and maintaining all fire, burglar and special purpose alarm systems on the base.

Refrigeration Shop, Bldg. 20687. This shop maintains and repairs all refrigeration and cooling units on base.

Plumbing Shop, Bldg. 20687. This shop is responsible for all aspects of installing and maintaining piping systems on base.

Pavements Shop, Bldg. 20687. This facility is responsible for maintenance and repair of roadways on base.

Grounds Shop, Bldg. 20687. The Grounds Shop is responsible for beautification of the base and for preservation of base property.

1606 TRANS

Minor Maintenance Shop, Bldg. 20341. This shop is responsible for performing all minor repairs and servicing for all government vehicles on the base.

Allied Trades Shop, Bldg. 344. This facility is responsible for radiator, body, upholstry, welding and paint work for all Kirtland AFB vehicles.

Refueling Maintenance, Bldg. 377. This facility is responsible for servicing, repair, and maintenance of all aircraft refueling vehicles.

Wheel and Tire Shop, Bldg. 20348. This shop is responsible for repair and replacement of all wheel and tires for government vehicles on base.

General Purpose Vehicle Maintenance, Bldg. 20338. This facility is responsible for major overhauls of vehicle engines and systems.

Heavy Equipment Shop, Bldg. 20423. This shop is responsible for repair, servicing and maintenance of all heavy equipment such as tractors, dump trucks, road grading equipment.

Battery Shop, Bldg. 20423. The Battery Shop is responsible for repair, servicing and refilling of battery cases both used and new.

Preserving, Packaging & Packing Shop, Bldg. 1015. This facility is responsible for proper packaging of all items for transportation off base.

Manzano Maintenance Shop, Bldg. 30142. This facility is responsible for routine maintenance and servicing of all vehicles associated with the Manzano Complex.

1606 SUPS

Maintenance, Supply, QC & Distribution, Bldg. 255. This office is responsible for maintaining adequate supplies of petroleum products and insuring the products meet base specification.

Fuel Storage & LOX, Bldg. 1033. This facility is responsible for maintaining adequate supplies of jet fuels, vehicle fuels and liquid oxygen.

ADPM/PCAM Computer Section, Bldg. 1010. This facility provides computer services for the supply units.

1606 MISCELLANEOUS

SP Armory, Bldg. 20221. This facility is used for special purposes and may serve as a training area for various small arms.

Reproduction Branch, bldg. 1010. This shop is responsible for photographing copies and reproduction of map books and other assigned copying material.

Small Arms Range, Bldg. 709. This facility is responsible for safety training in operation of M16 rifles and other arms.

Auto Hobby Shop, Bldg. 20375. This facility provides auto repair services.

Wood Hobby Shop, Bldg. 20440. This facility is the woodworking shop for base personnel.

Arts & Crafts Shop, Bldg. 954. This facility is the hobby shop for arts and crafts on base.

USAF HOSPITAL

OR & Central Supply, Bldg. 20140. This facility is responsible for patient operations.

Clinical Lab, Bldg. 20140. The Clinical Lab performs numerous types of patient analysis as requested by the medical staff.

Dental Services, Bldg. 20140. This facility performs routine dental work for base personnel.

Medical Maintenance, Bldg. 20140. This facility is responsible for maintaining, repairing and servicing all medical equipment for the base hospital.

Radiology, Bldg. 20140. This facility performs x-ray analysis for the hospital.

1960 COMMUNICATIONS

Closed Circuit TV Maintenance, Bldg. 20420. this facility is responsible for maintaining all closed circuit TVs used on base.

Telephone Cable Plant, Bldg. 20420. This facility is responsible for maintaining base telephone cable system.

Intra-base Radio Maintenance, Bldg. 20420. This shop is responsible for installing, maintaining and repair of all two-way radios, pagers and federal sirens located on base.

Teletype Maintenance, Bldg. 20420. This shop is responsible for repair and maintenance for all teletype equipment.

TAC Radio Maintenance, Bldg. 20420. This facility is responsible for all ground radio repair and maintenance, and all public address systems on the base.

Crypto Maintenance, Bldg. 20420. This facility services and maintains communications security devices for the base.

Telephone Outside Plant, Bldg. 20420. This shop is responsible for installation, maintenance and repair of outside telephone lines and associated switching equipment.

Telephone Inside Plant, bldg. 20420. This shop is responsible for inside switching systems and related equipment maintenance.

3098 AVIATION DEPOT SQUADRON (ADS)

Storage & Delivery Branch, Bldg. 37507. This facility's primary mission is transportation of weapons from storage structures maintenance plants and delivered to and from flightline air pads.

Munitions Handling Equipment Maintenance, Bldg. 37501. This shop is responsible for repair and maintenance of the MHU-7M bomb trailers.

Plant 3, Bldg. 37200. This facility's function is to assemble, test, repair, modify and maintain munitions.

Plant 4, Bldg. 37541. This facility's function is to assemble, test, repair, modify and maintain munitions.

DEFENSE NUCLEAR AGENCY (DNA)

Printing Plant & Binding Shop, Bldg. 20602. This shop is responsible for printing and publication of DNA related material.

Illustration Plant, Bldg. 20602. The Illustration Plant meets the DNA's graphic requirements. Items produced include charts, maps and graphs.

NEW MEXICO AIR NATIONAL GUARD (ANG)

Pneudraulics Shop, Bldg. 1043. The Pneudraulics Shop is primarily responsible for maintenance, repair and overhaul of brakes, struts and other hydraulic components.

Egress Shop, Bldg. 1043. This shop is primarily responsible for the repair and maintenance of A-7 aircrew ejection system.

Weapons Shop, Bldg. 1043. This shop is primarily responsible for gun systems and bomb release systems.

AGE & Tire Shop, Bldg. 1051. This shop deals primarily with aircraft cleaning and tire maintenance.

Fuels Shop, Bldg. 1043. This shop deals primarily with maintenance and repair of fuel systems on the A-7 aircraft.

Avionics Maintenance Branch, Bldg. 1060. This facility deals with aircraft instrumentation maintenance.

Photo Lab, Bldg. 1055. This facility provides photographic services for the Air National Guard.

Flight Communications, Bldg. 1053. Flight Communications deals primarily with training and maintenance of communications systems.

Forms & Reproduction, Bldg. 1055. This shop provides printing services for the Air National Guard.

Jet Engine Test Cell, Bldg. 1061. This facility is responsible for repair, maintenance and servicing of jet engines for the Air National Guard.

Vehicle Maintenance, Bldg. 1058. This facility is charged with responsibility for routine repair, maintenance and servicing for all Air National Guard vehicles.

Organizational Maintenance Shop, Bldg. 1043. This shop deals with aircraft maintenance and PHASE inspections on all ANG aircraft.

Welding Shop, Bldg. 1046. This shop is responsible for providing welding services to the Air National Guard.

Machine and Sheet Metal Shop, Bldg. 1047. This shop is responsible for air frame repair, fabrication and special projects.

Survival Equipment Shop, Bldg. 1047. This shop is responsible for testing, packing, inspecting and preparing parachutes, life rafts and associated rubber survival equipment.

NAVAL WEAPONS EVALUATION FACILITY (NWEF)

Air Frame Shop, Bldg. 1002. This shop is responsible for air frame repair, fabrication and special projects.

Ground Support Equipment, Bldg. 1002. This shop is primarily responsible for rendering immediate repair to ground power support equipment. These ground power units are used to start aircraft engines and provide power for accessories in support of the NWEF flying mission.

Paraloft AME Seat Shop, Bldg. 1002. This shop is responsible for repair and maintenance of the pilot's personal equipment.

Armament Shop, Bldg. 1002. This shop is primarily responsible for loading, handling and storing of explosives and associated naval aircraft ordnances.

Plant Shop, Bldg. 1002. This shop is responsible for performing repair and maintenance on NWEF aircraft engines.

Electrical Shop, Bldg. 1002. This shop is primarily responsible for electrical support and maintenance on aircraft.

Photo Lab, Bldg. 1002. This facility provides photographic services for the NWEF.

Material Control Shop, Bldg. 1002. This shop controls documentation, parts ordering and record keeping supplies necessary to support the NWEF mission.

Special Projects Shop, Bldg. 1002. This shop develops and constructs special electronic support devices to be used in the development of new naval weapon systems.

Avionics Shop, Bldg. 1002. This shop is primarily maintenance and repair of communications and navigations systems on naval aircraft.

Reproduction Shop, Bldg. 1002. This facility is responsible drafting, graphics and illustrating services.

MISCELLANEOUS UNITS

OL-A 1500 CSS Data Automation Shop, Bldg. 20604. This facility is a computer center for the base.

AFOSI/Electronics & Photo Shop, Bldg. 203D. This facility is a photo lab for provision of base services.

DET 23, 2 Weather Squadron, Equipment and Maintenance Shop, Bldg. 333. This facility provides weather forecast, environmental protection information for hazardous weather conditions at the base.

OL-QE AFCOM/Meat Department This facility is responsible for cutting and packaging all varieties of meat used on the base.

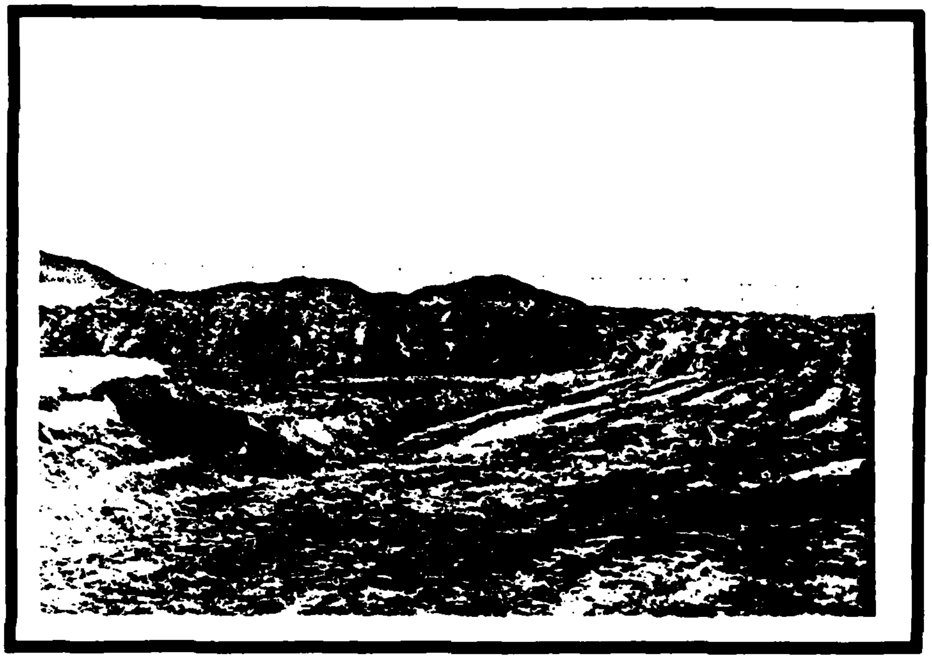
APPENDIX F

PHOTOGRAPHS

NO. 1 LANDFILL

NO. 1 LANDFILL

NO. 6 LANDFILL



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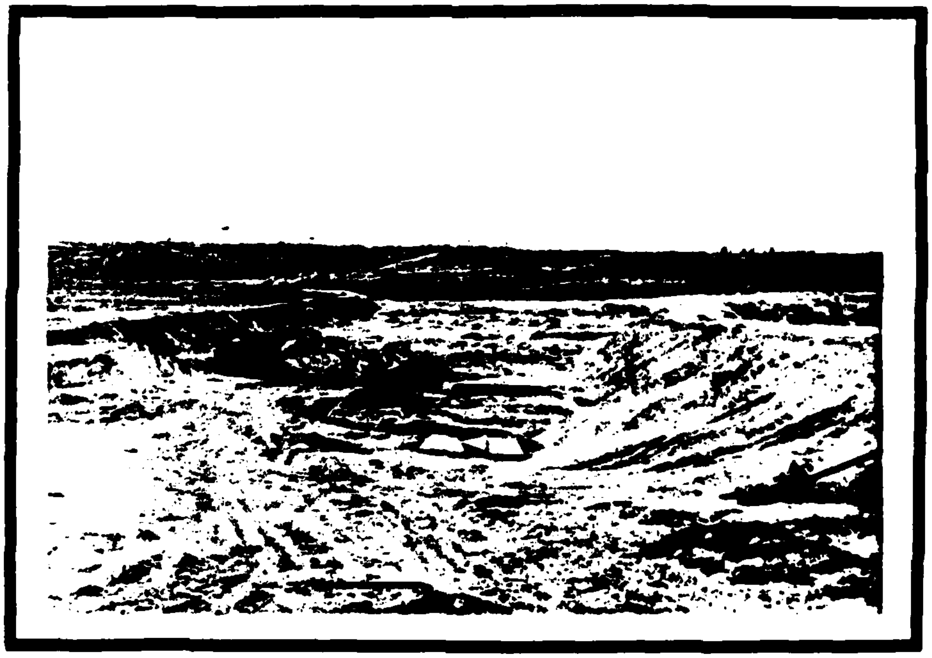
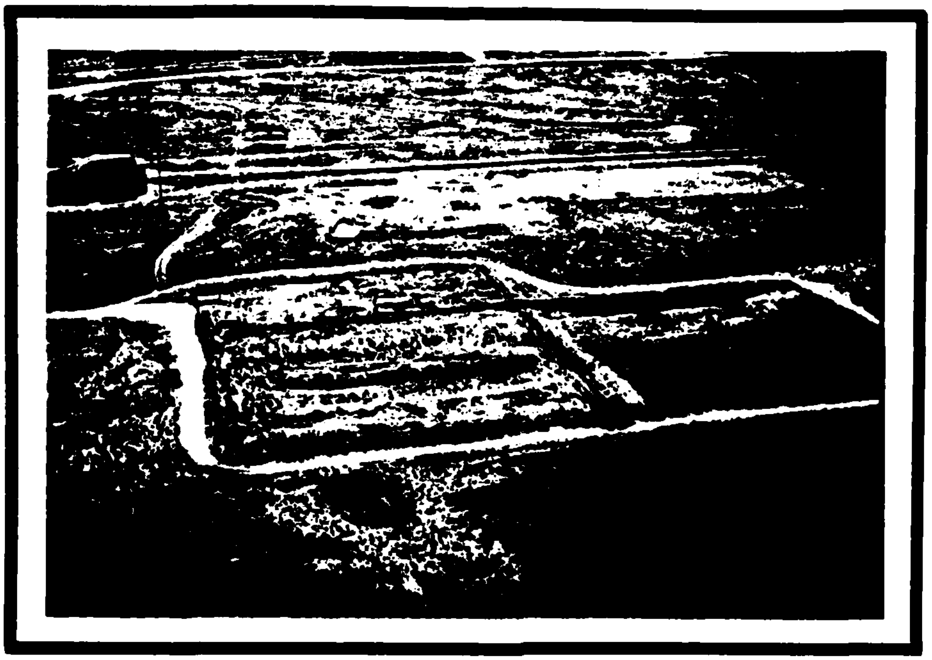
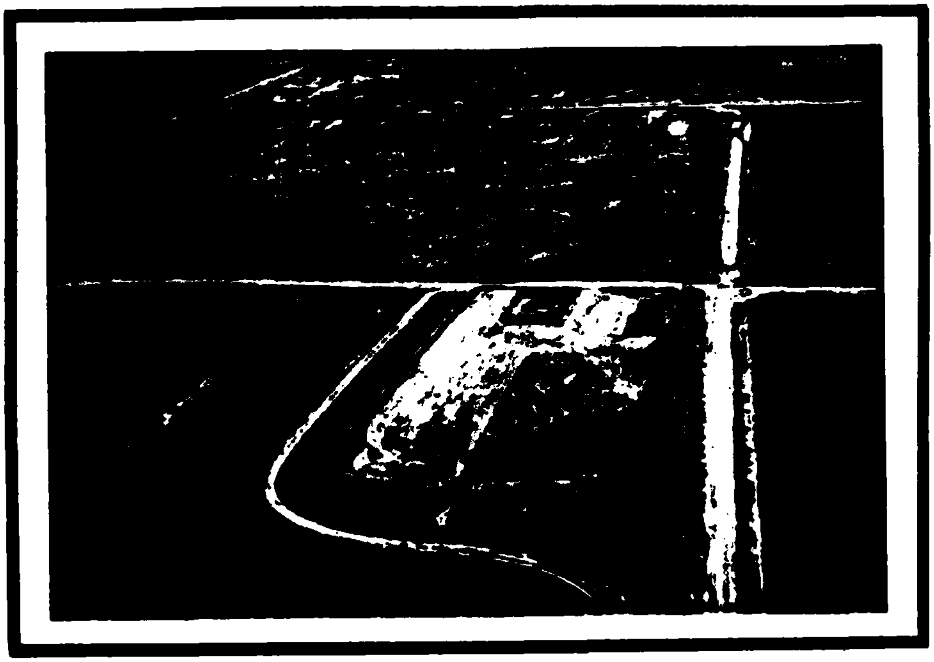


RADIOACTIVE WASTE BURIAL SITE / RB-3

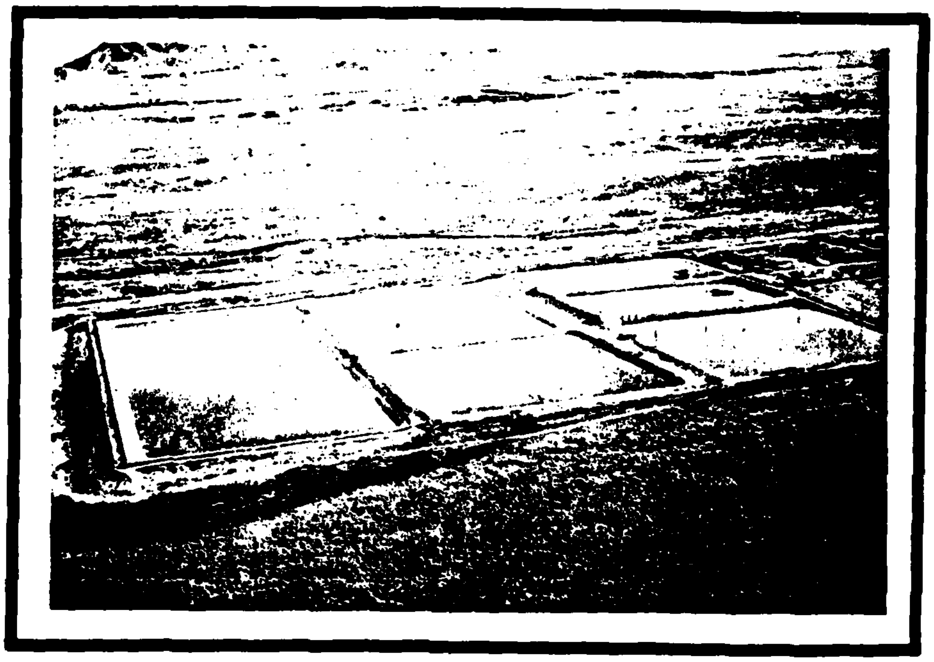


CHEMICAL WASTE LANDFILL

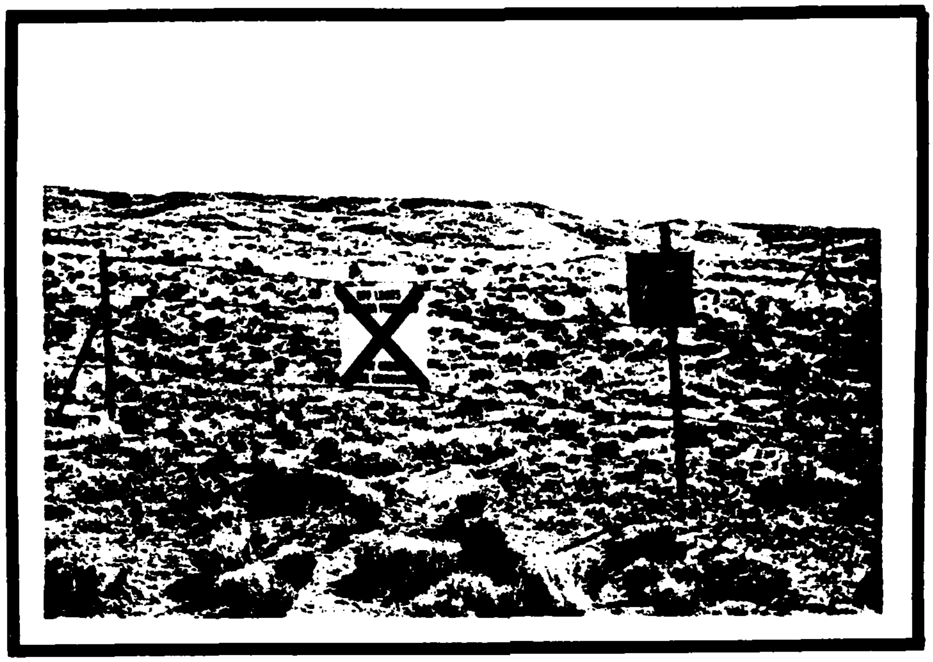


WASTE LAGOON NO. 1

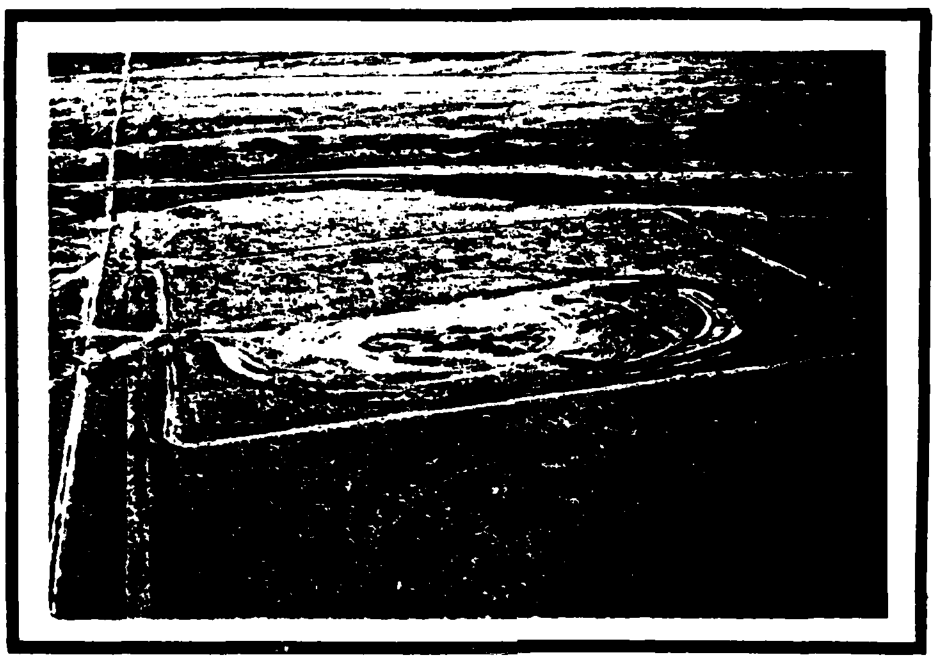
RADIOACTIVE WASTE LAGOON / RL-2



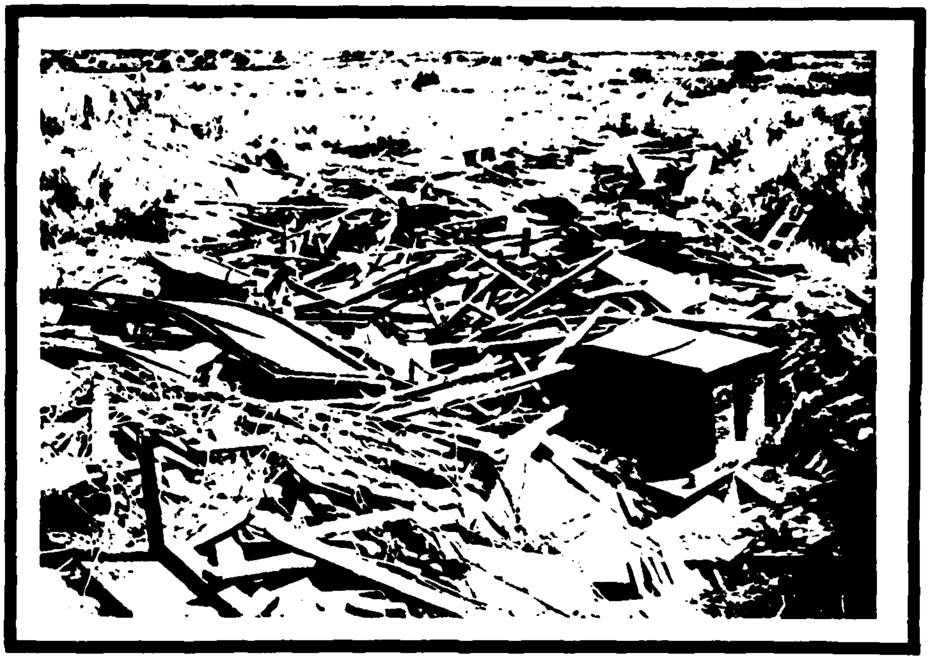
INWS TRAINING SITE / TS-2



INWS TRAINING SITE / TS-6



LANDFILL C



RADIOACTIVE WASTE LAGOON / RL-1

APPENDIX G

HAZARD EVALUATION METHODOLOGY

APPENDIX G

HAZARD EVALUATION METHODOLOGY

PRELIMINARY POTENTIAL CONTAMINATION ASSESSMENT

Various numerical methods for preliminary assessment of sites to determine the need of follow-up action have been developed. Under the auspices of EPA's Office of Enforcement, JRB Associates have devised a methodology for selecting sites for further investigation based on their potential for adverse environmental impact. A modified JRB technique has been developed by Engineering-Science and CH_2M Hill for analysis of the Phase I IRP studies (see memorandum dated July 8, 1981 at end of this Appendix). The methodology relies primarily on available information but does provide some mechanisms for handling missing data so that sites can be preliminarily rated in most cases. A brief discussion of the rating factor system of analysis follows.

Site Rating Factor System

The following four basic assessment criteria categories are used in the evaluation:

- Receptors
- Pathways
- Waste Characteristics, and
- Waste Management Practices

These categories have been further broken down into 31 generally applicable rating factors as presented in Table G-1. For each of the factors, a four-level rating scale has been developed ranging from "0" (indicating no potential hazard) to "3" (indicating a high potential hazard). These rating scales are also presented in Table G-1. It should be pointed out that these scales have been devised so that rating factors can typically be evaluated on the basis of readily available information from published materials public and private records, interviews with knowledgeable parties and site visits.

TABLE G.1

RATING FACTOR SYSTEM

RATING FACTORS	RATING SCALE LEVELS 0	1	2	3	Multiplier
RECEPTORS					
Population Within 1,000 Feet	0	1 to 25	26 to 100	Greater than 100	4
Distance to Nearest Drinking Water Well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	15
Distance to Reservation Boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
Land Use/Zoning	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
Critical Environments	Not a critical environment	Pristine natural areas	Wetlands, floodplains, and preserved areas; presence of economically important natural resources	Major habitat of an endangered or threatened species; presence of recharge area	12
Water Quality Designation of Nearest Surface Water Body	Agricultural or industrial use	Recreation, propagation and management of fish & wildlife	Shellfish propagation and harvesting	Potable water supplies	6

TABLE G.1

RATING FACTOR SYSTEM (cont'd)

RATING FACTORS	RATING SCALE LEVELS 0	1	2	3	Multiplier
		PATHWAYS			
Evidence of Water Contamination	No contamination	Indirect evidence	Positive proof from direct observation	Positive proof from laboratory analyses	10
Level of Water Contamination	No contamination	Low levels, trace levels, or levels less than maximum contaminant level (MCL) or EPA drinking water standards	Moderate levels or levels near MCL or EPA drinking water standards	High levels greater than MCL or EPA drinking water standards	15
Type of Contamination - Soil/ Biota	No contamination	Suspected contamination	Moderate contamination	Severe contamination	5
Distance to Nearest Surface Water	Greater than 1 mile	2,001 ft to 1 mile	501 ft. to 2,000 ft.	0 to 500 ft.	4
Depth to Groundwater	Greater than 500 ft.	51 to 500 ft.	11 to 50 ft.	0 to 10 ft.	7
Net Precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil Permeability	Greater than 50% clay ($<10^{-6}$ cm/s)	30% to 50% clay (10^{-4} to 10^{-6} cm/s)	15% to 30% clay (10^{-2} to 10^{-4} cm/s)	0 to 15% clay ($>10^{-2}$ cm/s)	6
Bedrock Permeability	Impermeable ($<10^{-6}$ cm/s)	Relatively impermeable (10^{-4} to 10^{-6} cm/s)	Relatively permeable (10^{-2} to 10^{-4} cm/s)	Very permeable ($>10^{-2}$ cm/s)	4
Depth to Bedrock	Greater than 60 ft.	31 to 60 ft.	11 to 30 ft.	0 to 10 ft.	4
Surface Erosion	None	Slight	Moderate	Severe	4

TABLE G.1

RATING FACTOR SYSTEM (cont'd)

WASTE CHARACTERISTICS

Judgemental hazardous rating from 30 to 100 points based on the *following* guidelines:

Points	Condition
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

Hazardous waste rating shall consider such characteristics as toxicity, radioactivity, persistence, ignitability, reactivity, corrosivity, solubility, volatility, and physical state.

TABLE G.1

RATING FACTOR SYSTEM (con'd)

RATING FACTORS	RATING SCALE LEVELS 0	1	2	3	Multiplier
	WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	Accurate records, no unauthorized dumping	Accurate records, no barriers	Incomplete records, no barriers	No records, no barriers	7
Hazardous Waste Quantity	<1 ton	1 to 5 tons	5 to 20 tons	>20 tons	7
Total Waste Quantity	0 to 10 acre ft.	11 to 100 acre ft.	101 to 250 acre ft.	Greater than 250 acre ft.	4
Waste Incompatibility	No incompatible wastes are present	Present, but does not pose a hazard	Present and may pose a future hazard	Present and posing an immediate hazard	3
Absence of Liners or Confining Strata	Liner and confining strata	Liner or confining strata	Low quality liner or low permeability strata	No liner, no confining strata	6
Use of Leachate Collection Systems	Adequate collection and treatment	Inadequate collection or treatment	Inadequate collection and treatment	No collection or treatment	6
Use of Gas Collection Systems	Adequate collection and treatment	Collection and controlled flaring	Venting or inadequate treatment	No collection or treatment	2
Site Closure	Impermeable cover	Low permeability cover	Permeable cover	Abandoned site, no cover	8
Subsurface Flows	Bottom of landfill greater than 5 ft. above high groundwater level	Bottom of landfill occasionally submerged	Bottom of fill frequently submerged	Bottom of fill located below mean groundwater level	7

Since the rating factors do not all assess the same magnitude of potential environmental impact, a numerical multiplier has been assigned to each factor. These multipliers were developed to indicate the relative magnitude of impact of that factor. In addition, weighting factors have been assigned to the Factor Subscores to arrive at a properly balanced Overall Score.

The following five hazard potential scores are the result of a site rating:

- Overall Score
- Receptors Subscore
- Pathways Subscore
- Waste Characteristics Subscore, and
- Waste Management Subscore.

M E M O R A N D U M

TO: Mr. Bernard Lindenberg, AFESC, Tyndall AFB, FL
Major Gary Fishburn, USAF OEHL, Brooks AFB, TX

FROM: Norman N. Hatch, Jr., CH2M HILL, Gainesville, FL NNH by EJS
Ernest J. Schroeder, Engineering-Science, Atlanta, GA EJS

DATE: July 8, 1981

SUBJECT: Joint Meeting between CH2M HILL and Engineering-Science to develop a uniform site rating system for use in all Air Force Installation Restoration Program Records Search Projects

MEETING
LOCATION: CH2M HILL, Gainesville, Florida office

MEETING
DATE: Monday, June 29, 1981

A. <u>Introduction and Purpose</u>

A joint meeting was held at the CH2M HILL Gainesville, Florida office on Monday, June 29, 1981. The purpose of the meeting was to develop a uniform site rating system for use in all upcoming Air Force Installation Restoration Program Records Search projects. Attendees at the meeting included:

- Norman N. Hatch, Jr., CH2M HILL Representative
- Ernest J. Schroeder, Engineering-Science Representative
- Major Gary Fishburn, Air Force Observer

The basis for the rating system is the document developed by JRB Associates, Inc., McLean, Virginia, for the EPA Hazardous Waste Enforcement Office, Washington, D.C. The above document presents a methodology for selecting sites for investigation based on their potential for adverse environmental impact. Careful scrutiny of this document by CH2M HILL and Engineering-Science indicated that the rating system could readily be used, with some modifications, for evaluating Air Force installation sites.

These modifications would be necessary for the following reasons:

1. The methodology presented in the JRB document was developed primarily for large landfill operations throughout the nation. Modifications are necessary to accurately address specific Air Force installation conditions.

2. The rating system must include an equivalent comparison of landfill sites and suspected contaminated sites other than landfills, e.g., PCB spills.

B. Modifications to the JRB Rating System

The specific modifications jointly developed by CH2M HILL and Engineering-Science, based on experience in performing Record Searches at several Air Force installations, are presented in the revised JRB rating form and rating factor system (attached). The modifications, in general, are summarized below:

1. Changes in multipliers for several of the rating factors in the receptors, pathways, and waste management practices categories.

2. Deletion of several existing rating factors and addition of new rating factors in the receptors, pathways, and waste management practices categories.

3. Revision of the waste characteristics category.

4. Special considerations in the use of the waste management practices category to provide meaningful comparison of landfills and contaminated areas other than landfills. These special considerations include:

   a. Use of all nine rating factors for the evaluation of landfills.

   b. Deletion of non-applicable rating factors when evaluating other contaminated areas. The category score is then normalized to provide an equivalent comparison with landfills.

CONCLUSION

All parties present at the meeting agreed that the above modifications would provide a meaningful rating system for Air Force installation sites. The system will be used in the next several Record Searches and then reevaluated to determine if further modifications are necessary.

NNH/EJS/lmr

WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site ____________________

Location ____________________

Owner/Operator ____________________

Comments ____________________

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet		4		
Distance to Nearest Drinking Water Well		15		
Distance to Reservation Boundary		6		
Land Use/Zoning		3		
Critical Environments		12		
Water Quality of Nearby Surface Water Body		6		

Number of Assumed Values = _____ Out of 6

Percentage of Assumed Values = _____%

Number of Missing Values = _____ Out of 6

Percentage of Missing Values = _____%

SUBTOTALS _____ _____

SUBSCORE _____

(Factor Score Divided by Maximum Score and Multiplied by 100)

PATHWAYS				
Evidence of Water Contamination		10		
Level of Water Contamination		15		
Type of Contamination, Soil/Biota		5		
Distance to Nearest Surface Water		4		
Depth to Groundwater		7		
Net Precipitation		6		
Soil Permeability		6		
Bedrock Permeability		4		
Depth to Bedrock		4		
Surface Erosion		4		

Number of Assumed Values = _____ Out of 10

Percentage of Assumed Values = _____%

Number of Missing Values = _____ Out of 10

Percentage of Missing Values = _____%

SUBTOTALS _____ _____

SUBSCORE _____

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantites of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE ______

Reason for Assigned Hazardous Rating:

______

______

______

WASTE MANAGEMENT PRACTICES

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
Record Accuracy and Ease of Access to Site		7		
Hazardous Waste Quantity		7		
Total Waste Quantity		4		
Waste Incompatibility		3		
Absence of Liners or Confining Beds		6		
Use of Leachate Collection System		6		
Use of Gas Collection Systems		2		
Site Closure		8		
Subsurface Flows		7		

Number of Assumed Values = ____ Out of 9

Percentage of Assumed Values = ____%

Number of Missing and Non-Applicable Values = ____ Out of 9

Percentage of Missing and Non-Applicalbe Values = ____%

SUBTOTALS ______ ______

SUBSCORE ______

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = ____ Out of 25

Overall Percentage of Assumed Values = ____%

OVERALL SCORE ______

(Receptors Subscore X 0.24 plus
Pathways Subscore X 0.33 plus
Waste Characteristics Subscore X 0.17 plus
Waste Management Subscore X 0.26)

RATING FACTOR SYSTEM GUIDELINES

RATING FACTORS	RATING SCALE LEVELS 0	1	2	3
RECEPTORS				
Population Within 1,000 Feet	0	1 to 25	26 to 100	Greater than 100
Distance to Nearest Drinking Water Well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet
Distance to Reservation Boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet
Land Use/Zoning	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential
Critical Environments	Not a critical environment	Pristine natural areas	Wetlands, floodplains, and preserved areas; presence of economically important natural resources	Major habitat of an endangered or threatened species; presence of recharge area
Water Quality Designation of Nearest Surface Water Body	Agricultural or industrial use	Recreation, propagation and management of fish & wildlife	Shellfish propagation and harvesting	Potable water supplies
PATHWAYS				
Evidence of Water Contamination	No contamination	Indirect evidence	Positive proof from direct observation	Positive proof from laboratory analyses
Level of Water Contamination	No contamination	Low levels, trace levels, or levels less than maximum contaminant level (MCL) or EPA drinking water standards	Moderate levels or levels near MCL or EPA drinking water standards	High levels greater than MCL or EPA drinking water standards
Type of Contamination - Soil/Biota	No contamination	Suspected contamination	Moderate contamination	Severe contamination
Distance to Nearest Surface Water	Greater than 1 mile	2,001 ft to 1 mile	501 ft. to 2,000 ft.	0 to 500 ft.
Depth to Groundwater	Greater than 500 ft.	51 to 500 ft.	11 to 50 ft.	0 to 10 ft.
Net Precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.
Soil Permeability	Greater than 50% clay ($<10^{-6}$ cm/s)	30% to 50% clay (10^{-4} to 10^{-6} cm/s)	15% to 30% clay (10^{-2} to 10^{-4} cm/s)	0 to 15% clay ($>10^{-2}$ cm/s)
Bedrock Permeability	Impermeable ($<10^{-6}$ cm/s)	Relatively impermeable (10^{-4} to 10^{-6} cm/s)	Relatively permeable (10^{-2} to 10^{-4} cm/s)	Very permeable ($>10^{-2}$ cm/s)
Surface Erosion	None	Slight	Moderate	Severe

WASTE CHARACTERISTICS	
Judgemental hazardous rating from 30 to 100 points based on the following guidelines:	
Points	**Condition**
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

RATING FACTORS	RATING SCALE LEVELS 0	1	2	3
	WASTE MANAGEMENT PRACTICES			
Record Accuracy and Ease of Access to Site	Accurate records, no unauthorized dumping	Accurate records, no barriers	Incomplete records, no barriers	No records, no barriers
Hazardous Waste Quantity	<1 ton	1 to 5 tons	5 to 20 tons	20 tons
Total Waste Quantity	0 to 10 acre ft.	11 to 100 acre ft.	101 to 250 acre ft.	Greater than 250 acre ft.
Waste Incompatibility	No incompatible wastes are present	Present, but does not pose a hazard	Present and may pose a future hazard	Present and posing an immediate hazard
Absence of Liners or Confining Strata	Liner and confining strata	Liner or confining strata	Low quality liner or low permeability strata	No liner, no confining strata
Use of Leachate Collection Systems	Adequate collection and treatment	Inadequate collection or treatment	Inadequate collection and treatment	No collection or treatment
Use of Gas Collection Systems	Adequate collection and treatment	Collection and controlled flaring	Venting or inadequate treatment	No collection or treatment
Site Closure	Impermeable cover	Low permeability cover	Permeable cover	Abandoned site, no cover
Subsurface Flows	Bottom of landfill greater than 5 ft. above high groundwater level	Bottom of landfill occasionally submerged	Bottom of fill frequently submerged	Bottom of fill located below mean groundwater level

APPENDIX H

SITE RATING FORMS

KIRTLAND AFB

SITE RATING FORMS

TABLE OF CONTENTS

WASTE DISPOSAL SITE AND SPILL AREA
ASSESSMENT AND RATING FORM

Name of Site Landfill No. 1

Location South of E-W runway and east of Bldg. 600

Owner/Operator Kirtland AFB (1965-1975), Sandia Labs (1969-1975)

Comments 22 acre site, suspected wastes include organics, inorganics, solvents, mixed municipal waste, etc.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	2	3	6	[illegible]
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
		SUBTOTALS	63	138
		SUBSCORE		46

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	1	10	10	30
Level of Water Contamination	2	15	30	45
Type of Contamination, Soil/Biota	2	5	10	15
Distance to Nearest Surface Water	3	4	12	12
Depth to Groundwater	1	7	7	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	0	0
Surface Erosion	3	4	12	12
		SUBTOTALS	99	171
		SUBSCORE		58

Number of Assumed Values = 0 Out of 10

Percentage of Assumed Values = 0 %

Number of Missing Values = 2 Out of 10

Percentage of Missing Values = 20 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points

30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 60

Reason for Assigned Hazardous Rating:

Small quantities visible. Evidence of moderate quantities.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		3	7	21	21
Hazardous Waste Quantity	Assumed	2	7	14	21
Total Waste Quantity		3	4	12	12
Waste Incompatibility	Assumed	2	3	6	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection Systems		3	2	6	6
Site Closure		3	8	24	24
Subsurface Flows		0	7	0	21

Number of Assumed Values = 2 Out of 9

Percentage of Assumed Values = 22 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS 119 150

SUBSCORE 79

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 2 Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE 64

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site: Fire Training Area

Location: Near FAA Control Tower

Owner/Operator: USAF

Comments: In same general area as new fire training facility

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 69 138

SUBSCORE 50

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota — Assumed dumping of waste solvent in pits.	2	5	10	15
Distance to Nearest Surface Water	0	4	0	12
Depth to Groundwater	1	7	7	21
Net Precipitation	[illegible]	6	[illegible]	[illegible]
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	[illegible]	[illegible]
Surface Erosion	[illegible]	4	[illegible]	12

Number of Assumed Values = 1 Out of 10

Percentage of Assumed Values = 10 %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = 20 %

SUBTOTALS 35 [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 80

Reason for Assigned Hazardous Rating:
Fire Department personnel stated 1-2 drum waste solvents per month dumped for period of years.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		[illegible]	7	[illegible]	[illegible]
Hazardous Waste Quantity	Assumed	[illegible]	7	[illegible]	[illegible]
Total Waste Quantity		[illegible]	4	[illegible]	[illegible]
Waste Incompatibility	Assumed	[illegible]	3	[illegible]	[illegible]
Absence of Liners or Confining Beds		[illegible]	6	18	[illegible]
Use of Leachate Collection System		[illegible]	6	18	[illegible]
Use of Gas Collection Systems		[illegible]	2	[illegible]	[illegible]
Site Closure		[illegible]	8	16	24
Subsurface Flows		[illegible]	7	[illegible]	[illegible]

Number of Assumed Values = [illegible] Out of 9
Percentage of Assumed Values = [illegible] %
Number of Missing and Non-Applicable Values = ____ Out of 9
Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS [illegible] 150
SUBSCORE [illegible]
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25
Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

[redacted]

WASTE DISPOSAL SITE AND SPILL AREA
ASSESSMENT AND RATING FORM

Name of Site: Landfill No. 4

Location: East of DOE Area I

Owner/Operator: Sandia Base with city contract 1964-1969)

Comments: 27 acre site

Suspected wastes may include organics, inorganics, solvents, mixed municipal wastes, etc.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS: 63 | 138

SUBSCORE: 46

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	[illegible]	[illegible]
Level of Water Contamination	0	15	[illegible]	45
Type of Contamination, Soil/Biota	[illegible]	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	1	7	7	21
Net Precipitation	[illegible]	6	[illegible]	[illegible]
Soil Permeability	3	6	[illegible]	[illegible]
Bedrock Permeability	NA	4	0	
Depth to Bedrock	NA	4	[illegible]	
Surface Erosion	[illegible]	4	[illegible]	[illegible]

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = [illegible] %

SUBTOTALS: [illegible] | [illegible]

SUBSCORE: [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points

30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 70

Reason for Assigned Hazardous Rating:

During period when the landfill was operating no segregation of hazardous wastes was practiced. Suspect moderate quantity was disposed.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		3	7	21	21
Hazardous Waste Quantity	Assumed	1	7	7	21
Total Waste Quantity		2	4	8	12
Waste Incompatibility	Assumed	2	3	6	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection Systems		[illegible]	2	[illegible]	6
Site Closure		2	8	16	24
Subsurface Flows		0	7	0	21
			SUBTOTALS	100	150
			SUBSCORE		67

Number of Assumed Values = 2 Out of 9

Percentage of Assumed Values = 22 %

Number of Missing and Non-Applicable Values = ___ Out of 9

Percentage of Missing and Non-Applicable Values = ___ %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 2 Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site: Landfill No. 2 & 3

Location: Near ARES and EMP sites

Owner/Operator: Sandia Base (1943-1965)

Comments: 55 acre site

Operated as open dump, wastes unknown

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS: 57 / 138

SUBSCORE: 41

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	1	7	7	21
Net Precipitation	0	6	0	18
Soil Permeability	[illegible]	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	0	
Surface Erosion	0	4	[illegible]	12

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = 2 Out of 10

Percentage of Missing Values = 20 %

SUBTOTALS: [illegible] / [illegible]

SUBSCORE: [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 70

Reason for Assigned Hazardous Rating:

During period when landfill was in operation, hazardous waste segregation was not practical. Suspect moderate quantities sent to this landfill.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		3	7	21	21
Hazardous Waste Quantity	Assumed	2	7	14	21
Total Waste Quantity		3	4	12	12
Waste Incompatibility	Assumed	2	3	6	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection Systems		[illegible]	2	6	6
Site Closure		2	8	16	24
Subsurface Flows		0	7		21

Number of Assumed Values = 2 Out of 9

Percentage of Assumed Values = 22 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicable Values = 0 %

SUBTOTALS [illegible] 15[illegible]

SUBSCORE 74

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = 8 %

OVERALL SCORE 47

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RB-11

Location KAFB Riding Club

Owner/Operator KAFB Riding Club

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	0	6	0	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
		SUBTOTALS	51	138
		SUBSCORE		37

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	2	7	14	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	0	0
Surface Erosion	0	4	0	12
		SUBTOTALS	36	171
		SUBSCORE		21

Number of Assumed Values = 0 Out of 10

Percentage of Assumed Values = 0 %

Number of Missing Values = 2 Out of 10

Percentage of Missing Values = 20 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 90

Reason for Assigned Hazardous Rating:

Large quantity of low-level radioactive material. Some elements with long ½ lives

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	3	7	21	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility Assumed	1	3	3	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	[illegible]	2	6	6
Site Closure	1	8	8	24
Subsurface Flows	0	7	0	21

Number of Assumed Values = 1 Out of 9

Percentage of Assumed Values = 11 %

Number of Missing and Non-Applicable Values = ____ Out of 9

Percentage of Missing and Non-Applicable Values = ____ %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25

Overall Percentage of Assumed Values = 4 %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RL-1

Location North of DOE Tech Area III

Owner/Operator Sandia Labs

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
		SUBTOTALS	57	138
		SUBSCORE		41

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS					
Evidence of Water Contamination		3	10	30	30
Level of Water Contamination	Water contamination in the ponds themselves	1	15	15	45
Type of Contamination, Soil/Biota	Water contamination in the ponds themselves	1	5	5	15
Distance to Nearest Surface Water	Assumed	1	4	4	12
Depth to Groundwater		1	7	[illegible]	21
Net Precipitation		0	6	0	18
Soil Permeability		[illegible]	6	18	18
Bedrock Permeability		NA	4	0	0
Depth to Bedrock		NA	4	0	[illegible]
Surface Erosion		NA	4	[illegible]	[illegible]
			SUBTOTALS	[illegible]	[illegible]
			SUBSCORE		[illegible]

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = [illegible] %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:

Small quantities of liquid radioactive materials may be present.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	NA	7	0	0
Hazardous Waste Quantity	NA	7	0	0
Total Waste Quantity	NA	4	0	0
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	[illegible]	6	18	18
Use of Leachate Collection System	NA	6	0	0
Use of Gas Collection Systems	NA	2	0	0
Site Closure	NA	3	[illegible]	[illegible]
Subsurface Flows	0	7	[illegible]	21

Number of Assumed Values = [illegible] Out of 9

Percentage of Assumed Values = [illegible] %

Number of Missing and Non-Applicable Values = [illegible] Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA
ASSESSMENT AND RATING FORM

Name of Site: Landfill A

Location: South of FAA Control Tower

Owner/Operator: USAF owns, no operator

Comments: Indiscriminate dumping site

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
		SUBTOTALS	63	138
		SUBSCORE		46

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBSCORE (Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	1	7	7	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	[illegible]
Depth to Bedrock	NA	4	0	[illegible]
Surface Erosion	2	4	8	12
		SUBTOTALS	37	171
		SUBSCORE		22

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = 2 Out of 10

Percentage of Missing Values = 20 %

SUBSCORE (Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:
Suspect small quantities of hazardous material disposed here.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		3	7	21	21
Hazardous Waste Quantity	Assumed	1	7	7	21
Total Waste Quantity	Assumed	2	4	8	12
Waste Incompatibility	Assumed	1	3	3	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection Systems		3	2	6	6
Site Closure		3	8	24	24
Subsurface Flows		0	7	0	21
			SUBTOTALS	105	150
			SUBSCORE		[illegible]

Number of Assumed Values = ____ Out of 9

Percentage of Assumed Values = ____ %

Number of Missing and Non-Applicable Values = ____ Out of 9

Percentage of Missing and Non-Applicable Values = ____ %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = ____ Out of 25

Overall Percentage of Assumed Values = ____ %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site TS-1 through TS-8

Location North-central portion of base.

Owner/Operator INWS

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
		SUBTOTALS	57	138
		SUBSCORE		41

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	1	7	7	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	[illegible]	0
Surface Erosion	NA	4	[illegible]	[illegible]
		SUBTOTALS	33	159
		SUBSCORE		21

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = [illegible] %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE [illegible]

Reason for Assigned Hazardous Rating:

Thorium sludge spread on ground at sites.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		1	7		
Hazardous Waste Quantity		2	7	[illegible]	[illegible]
Total Waste Quantity	NA		4	[illegible]	
Waste Incompatibility	NA		3		
Absence of Liners or Confining Beds		[illegible]	6	[illegible]	[illegible]
Use of Leachate Collection System	NA		6	[illegible]	[illegible]
Use of Gas Collection Systems	NA		2		
Site Closure	NA		8	[illegible]	[illegible]
Subsurface Flows		[illegible]	7	[illegible]	[illegible]

Number of Assumed Values = [illegible] Out of 9

Percentage of Assumed Values = ____ %

Number of Missing and Non-Applicable Values = [illegible] Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = ____ %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site: Landfill No. 6

Location: East of DOE area I

Owner/Operator: Kirtland AFB (1975 to present)

Comments: 20 acre site

Site accepted municipal wastes. Some hazardous materials may have been accepted when site was first opened

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
SUBTOTALS			63	138
SUBSCORE (Factor Score Divided by Maximum Score and Multiplied by 100)				46

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	2	4	8	12
Depth to Groundwater	1	7	7	21
Net Precipitation	[illegible]	6	[illegible]	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	[illegible]
Depth to Bedrock	NA	4	0	[illegible]
Surface Erosion	[illegible]	4	[illegible]	12
SUBTOTALS			[illegible]	[illegible]
SUBSCORE (Factor Score Divided by Maximum Score and Multiplied by 100)				[illegible]

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = [illegible] %

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points

30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:

This is the present landfill. Hazardous waste segregation has been practiced, however, suspect small quantity has been disposed here.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		2	7	14	21
Hazardous Waste Quantity	Assumed	1	7	7	21
Total Waste Quantity		3	4	12	12
Waste Incompatibility	Assumed	1	3	3	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection Systems		[illegible]	2	6	[illegible]
Site Closure		2	8	16	24
Subsurface Flows	Active site	0	7	0	21
			SUBTOTALS	94	150
			SUBSCORE		[illegible]

Number of Assumed Values = [illegible] Out of 9

Percentage of Assumed Values = [illegible] %

Number of Missing and Non-Applicable Values = [illegible] Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE 42

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site Wastewater Lagoons

Location Northwest of Trestle Facility

Owner/Operator Wastewater from KAFB

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
		SUBTOTALS	57	138
		SUBSCORE		41

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination Lagoon water contaminated	2	10	20	30
Level of Water Contamination Assumed	3	15	45	45
Type of Contamination, Soil/Biota Assumed	0	5	0	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	1	7	7	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	0	0
Surface Erosion	NA	4	0	0
		SUBTOTALS	94	159
		SUBSCORE		59

Number of Assumed Values = 2 Out of 10

Percentage of Assumed Values = 20 %

Number of Missing Values = 3 Out of 10

Percentage of Missing Values = 30 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:
Suspect small quantities of hazardous waste sewered and entered lagoon

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	1	7	7	21
Hazardous Waste Quantity Assumed	0	7	0	21
Total Waste Quantity	1	4	4	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	1	6	[illegible]	18
Use of Leachate Collection System	0	6	[illegible]	18
Use of Gas Collection Systems	NA	2	0	0
Site Closure	NA	8	0	0
Subsurface Flows	0	7	[illegible]	21

Number of Assumed Values = 1 Out of 9

Percentage of Assumed Values = 11 %

Number of Missing and Non-Applicable Values = 2 Out of 9

Percentage of Missing and Non-Applicable Values = 22 %

SUBTOTALS 17 120

SUBSCORE 14

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE 41

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RB-7

Location Manzano area

Owner/Operator

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 33 138

SUBSCORE 24

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	[illegible]
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	[illegible]	5	[illegible]	15
Distance to Nearest Surface Water	0	4	0	12
Depth to Groundwater	[illegible]	7	14	21
Net Precipitation	[illegible]	6	[illegible]	[illegible]
Soil Permeability	2	6	12	[illegible]
Bedrock Permeability	NA	4	[illegible]	[illegible]
Depth to Bedrock	NA	4	[illegible]	[illegible]
Surface Erosion	1	4	4	12

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 80

Reason for Assigned Hazardous Rating:

Known 449 ft^3 of low-level radioactive waste disposed of prior to Dec. 31, 1963

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	3	7	21	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	0
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	3	6	18	18
Use of Gas Collection Systems	3	2	6	6
Site Closure	2	8	16	24
Subsurface Flows	0	7	0	21

Number of Assumed Values = 2 Out of 9

Percentage of Assumed Values = 22 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS 93 150

SUBSCORE 62

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE 41

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA
ASSESSMENT AND RATING FORM

Name of Site: Entomology Shop

Location: Bldg. 20684

Owner/Operator: French drain used to dispose of cleaning waste from sink in Entomology Shop.

Comments:

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 57 138

SUBSCORE 52

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	[illegible]
Level of Water Contamination	0	15	0	[illegible]
Type of Contamination, Soil/Biota	1	5	[illegible]	[illegible]
Distance to Nearest Surface Water	0	4	0	[illegible]
Depth to Groundwater	1	7	7	[illegible]
Net Precipitation	[illegible]	6		[illegible]
Soil Permeability	3	6	18	
Bedrock Permeability	NA	4	-	-
Depth to Bedrock	NA	4	-	-
Surface Erosion	NA	4	-	-

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = 3 Out of 10

Percentage of Missing Values = 30 %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:

Assessment of waste quantities from cleaning operations.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	2	7	14	21
Hazardous Waste Quantity	1	7	7	21
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds	3	6	18	18
Use of Leachate Collection System	NA	6	-	-
Use of Gas Collection Systems	NA	2	-	-
Site Closure	NA	8	-	-
Subsurface Flows	NA	7	-	-

Number of Assumed Values = 2 Out of 9

Percentage of Assumed Values = 22 %

Number of Missing and Non-Applicable Values = 4 Out of 9

Percentage of Missing and Non-Applicable Values = 44 %

SUBTOTALS [illegible] 81

SUBSCORE 48

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 5 Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site Landfill B

Location Northeast of CERF

Owner/Operator USAF owns, no operator

Comments Indescriminate dump site

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18
		SUBTOTALS	57	138
		SUBSCORE		41

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	0	4	0	12
Depth to Groundwater	2	7	14	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	
Depth to Bedrock	NA	4	0	
Surface Erosion	2	4	8	12
		SUBTOTALS	40	171
		SUBSCORE		23

Number of Assumed Values = 0 Out of 10

Percentage of Assumed Values = 0 %

Number of Missing Values = 2 Out of 10

Percentage of Missing Values = 20 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:

Site appears to be indescriminate residential dump.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		3	7	21	21
Hazardous Waste Quantity	Assumed	0	7	0	21
Total Waste Quantity		0	4	0	12
Waste Incompatibility	Assumed	0	3	0	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		[illegible]	6	18	18
Use of Gas Collection Systems		[illegible]	2	[illegible]	[illegible]
Site Closure		[illegible]	8	24	24
Subsurface Flows		0	7	[illegible]	21

Number of Assumed Values = [illegible] Out of 9

Percentage of Assumed Values = 22 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicable Values = 0 %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site Manzano Fire Training Pits

Location West of Manzano Base Buildings

Owner/Operator USAF owns, no present operator

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	0	6	0	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = [illegible] Out of 6

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 6

Percentage of Missing Values = [illegible] %

SUBTOTALS 51 [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	[illegible]	10	[illegible]	[illegible]
Level of Water Contamination	[illegible]	15	[illegible]	45
Type of Contamination, Soil/Biota	1	5	[illegible]	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	[illegible]	7	14	21
Net Precipitation		6	[illegible]	[illegible]
Soil Permeability		6	[illegible]	18
Bedrock Permeability	NA	4	[illegible]	[illegible]
Depth to Bedrock	NA	4	[illegible]	[illegible]
Surface Erosion	[illegible]	4	[illegible]	12

Number of Assumed Values = ____ Out of 10

Percentage of Assumed Values = ____ %

Number of Missing Values = ____ Out of 10

Percentage of Missing Values = ____ %

SUBTOTALS 41 [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:
Suspect some waste fuel soaked into ground before and after fire training.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		3	7	21	21
Hazardous Waste Quantity	Assumed	1	7	7	21
Total Waste Quantity		0	4	0	12
Waste Incompatibility	Assumed	0	3	0	9
Absence of Liners or Confining Beds	Broken asphalt liner	2	6	12	18
Use of Leachate Collection System		[illegible]	6		18
Use of Gas Collection Systems		[illegible]	2		[illegible]
Site Closure		[illegible]	8	[illegible]	[illegible]
Subsurface Flows		[illegible]	7		[illegible]

Number of Assumed Values = [illegible] Out of 9

Percentage of Assumed Values = [illegible] %

Number of Missing and Non-Applicable Values = ____ Out of 9

Percentage of Missing and Non-Applicable Values = ____ %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA
ASSESSMENT AND RATING FORM

Name of Site: Manzano Dump

Location: West of offices, Manzano area

Owner/Operator: Manzano Base (1947-1971)

Comments: Small site. Operated as dump for general refuse. Closed site with partial cover.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	0	6	0	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 51 138

SUBSCORE 37

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	0	4	[illegible]	12
Depth to Groundwater	2	7	14	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	0	0
Surface Erosion	1	4	4	12

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = 0 %

Number of Missing Values = 2 Out of 10

Percentage of Missing Values = 20 %

SUBTOTALS [illegible] 171

SUBSCORE 21

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:

Generation of hazardous waste was not reported in the Manzano area. Waste generated primarily from offices and housing area.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		2	7	14	21
Hazardous Waste Quantity	Assumed	0	7	0	21
Total Waste Quantity		1	4	4	12
Waste Incompatibility	Assumed	0	3	0	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection System		3	2	6	6
Site Closure		2	8	16	24
Subsurface Flows		0	7	0	21

Number of Assumed Values = 2 Out of 9 — SUBTOTALS 76 150

Percentage of Assumed Values = 22 % — SUBSCORE 51

Number of Missing and Non-Applicable Values = 0 Out of 9 — (Factor Score Divided by Maximum Score and Multiplied by 100)

Percentage of Missing and Non-Applicable Values = [illegible] %

Overall Number of Assumed Values = 2 Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site: Landfill C

Location: East of Manzano, near Police Training Area

Owner/Operator: USAF owns, no operator

Comments: Indescriminate dump site

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	2	6	12	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 33 138

SUBSCORE 24

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	[illegible]	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	1	7	7	21
Net Precipitation	[illegible]	6	0	18
Soil Permeability	2	6	12	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4		[illegible]
Surface Erosion	1	4	4	12

Number of Assumed Values = 0 Out of 10

Percentage of Assumed Values = ___ %

Number of Missing Values = 0 Out of 10

Percentage of Missing Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE [illegible]

Reason for Assigned Hazardous Rating:

Open dump. Demolition debris. Remote from hazardous waste sources.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		3	7	21	21
Hazardous Waste Quantity	Assumed	[illegible]	7	0	21
Total Waste Quantity		[illegible]	4	[illegible]	12
Waste Incompatibility	Assumed	[illegible]	3	[illegible]	[illegible]
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		[illegible]	6	[illegible]	[illegible]
Use of Gas Collection Systems		[illegible]	2	[illegible]	
Site Closure		3	8	24	24
Subsurface Flows			7		21

Number of Assumed Values = ___ Out of 9 SUBTOTALS ___ ___

Percentage of Assumed Values = ___% SUBSCORE ___

Number of Missing and Non-Applicable Values = ___ Out of 9 (Factor Score Divided by Maximum Score and Multiplied by 100)

Percentage of Missing and Non-Applicable Values = ___%

Overall Number of Assumed Values = ___ Out of 25

Overall Percentage of Assumed Values = ___%

OVERALL SCORE ___

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RB-10

Location Lovelace ITRI

Owner/Operator Lovelace ITRI

Comments Holding area - not a disposal site.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	[illegible]	3	[illegible]	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = [illegible] Out of 6

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 6

Percentage of Missing Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	[illegible]	15	0	45
Type of Contamination, Soil/Biota	[illegible]	5	[illegible]	[illegible]
Distance to Nearest Surface Water		4	[illegible]	12
Depth to Groundwater	2	7	14	21
Net Precipitation		6		[illegible]
Soil Permeability	3	6	[illegible]	[illegible]
Bedrock Permeability	NA	4		
Depth to Bedrock	NA	4		
Surface Erosion	NA	4		

Number of Assumed Values = ____ Out of 10

Percentage of Assumed Values = ____ %

Number of Missing Values = ____ Out of 10

Percentage of Missing Values = ____ %

SUBTOTALS ______ ______

SUBSCORE ______

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:

Holding area for contaminated [illegible], equipment, and storage of drums prior to disposal

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	0	7	[illegible]	21
Hazardous Waste Quantity	NA	7	0	0
Total Waste Quantity	0	4	0	12
Waste Incompatibility	0	3	0	9
Absence of Liners or Confining Beds		6	[illegible]	[illegible]
Use of Leachate Collection System		6	[illegible]	[illegible]
Use of Gas Collection Systems	NA	2	[illegible]	[illegible]
Site Closure	NA	3	[illegible]	0
Subsurface Flows	[illegible]	[illegible]		21

Number of Assumed Values = ____ Out of 9

Percentage of Assumed Values = ____ %

Number of Missing and Non-Applicable Values = [illegible] Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS ____ [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = ____ Out of 25

Overall Percentage of Assumed Values = ____ %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RL-2

Location Lovelace

Owner/Operator Lovelace Inhalation Toxicology Research Institute

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 39 138

SUBSCORE 28

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota Assumed	[illegible]	5	0	15
Distance to Nearest Surface Water	0	4	0	12
Depth to Groundwater	2	7	14	[illegible]
Net Precipitation	[illegible]	6	[illegible]	[illegible]
Soil Permeability	[illegible]	6	[illegible]	[illegible]
Bedrock Permeability	NA	4	[illegible]	-
Depth to Bedrock	NA	4	[illegible]	[illegible]
Surface Erosion	NA	4		[illegible]

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

<u>Hazardous Rating</u>: Judgemental rating from 30 to 100 points based on the following guidelines:

<u>Points</u>

30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE [illegible]

Reason for Assigned Hazardous Rating:
Small quantities of radioactive wastes present. Man-made radioactivity present in water and sediment.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	NA	7	[illegible]	[illegible]
Hazardous Waste Quantity	NA	7	[illegible]	[illegible]
Total Waste Quantity	NA	4	[illegible]	[illegible]
Waste Incompatibility	[illegible]	3	[illegible]	[illegible]
Absence of Liners or Confining Beds	[illegible]	6	[illegible]	[illegible]
Use of Leachate Collection System	NA	6	[illegible]	
Use of Gas Collection Systems	NA	2	[illegible]	[illegible]
Site Closure	NA	8	[illegible]	[illegible]
Subsurface Flows	[illegible]	7	[illegible]	[illegible]
		SUBTOTALS	[illegible]	[illegible]
		SUBSCORE		[illegible]

Number of Assumed Values = [illegible] Out of 9

Percentage of Assumed Values = [illegible] %

Number of Missing and Non-Applicable Values = [illegible] Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RL-3

Location Lovelace

Owner/Operator Lovelace Inhalation Toxicology Research Institute

Comments

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS					
Population Within 1,000 Feet		0	4	0	12
Distance to Nearest Drinking Water Well		1	15	15	45
Distance to Reservation Boundary		3	6	18	18
Land Use/Zoning		2	3	6	9
Critical Environments		0	12	0	36
Water Quality of Nearby Surface Water Body		0	6	[illegible]	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 39 138

SUBSCORE 28

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS					
Evidence of Water Contamination	Water contamination in the ponds themselves	0	10	0	30
Level of Water Contamination	Water contamination in the ponds themselves	0	15	0	45
Type of Contamination, Soil/Biota	Assumed	0	5	0	15
Distance to Nearest Surface Water		0	4	0	12
Depth to Groundwater		2	7	14	21
Net Precipitation		[illegible]	6	[illegible]	18
Soil Permeability		3	6	18	18
Bedrock Permeability		NA	4		[illegible]
Depth to Bedrock		NA	4	[illegible]	[illegible]
Surface Erosion		NA	4	[illegible]	[illegible]

Number of Assumed Values = 1 Out of 10

Percentage of Assumed Values = 10 %

Number of Missing Values = 3 Out of 10

Percentage of Missing Values = 30 %

SUBTOTALS 32 159

SUBSCORE 20

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 100

Reason for Assigned Hazardous Rating:
[illegible] levels up to 100 times drinking water levels

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	[illegible]	[illegible]	[illegible]	21
Hazardous Waste Quantity	NA	7	[illegible]	[illegible]
Total Waste Quantity	NA	4	[illegible]	[illegible]
Waste Incompatibility		3	[illegible]	[illegible]
Absence of Liners or Confining Beds		6	[illegible]	[illegible]
Use of Leachate Collection System	NA	6	[illegible]	[illegible]
Use of Gas Collection Systems	NA	2	[illegible]	[illegible]
Site Closure	NA	8	[illegible]	[illegible]
Subsurface Flows		[illegible]		21

Number of Assumed Values = ____ Out of 9

Percentage of Assumed Values = ____ %

Number of Missing and Non-Applicable Values = ____ Out of 9

Percentage of Missing and Non-Applicable Values = ____ %

SUBTOTALS ______ [illegible]

SUBSCORE ______

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = ____ Out of 25

Overall Percentage of Assumed Values = ____ %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RB-4, RB-5, RB-6, RB-8, RB-9

Location Manzano Area

Owner/Operator Holding tanks for radioactive liquid waste - not a disposal area

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	[illegible]	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 27 138

SUBSCORE 20

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	0	10	0	[illegible]
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	1	7	7	21
Net Precipitation	[illegible]	6	[illegible]	[illegible]
Soil Permeability	2	6	12	18
Bedrock Permeability	NA	4	[illegible]	0
Depth to Bedrock	NA	4	0	0
Surface Erosion	NA	4	0	[illegible]

Number of Assumed Values = ____ Out of 10

Percentage of Assumed Values = ____ %

Number of Missing Values = ____ Out of 10

Percentage of Missing Values = ____ %

SUBTOTALS [illegible] 159

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 50

Reason for Assigned Hazardous Rating:
No known storage of radioactive waste in tanks

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		[illegible]	7	[illegible]	[illegible]
Hazardous Waste Quantity	Assumed	[illegible]	7	[illegible]	[illegible]
Total Waste Quantity	Assumed	[illegible]	4	[illegible]	[illegible]
Waste Incompatibility		[illegible]	3	[illegible]	[illegible]
Absence of Liners or Confining Beds	Tank	[illegible]	6	[illegible]	[illegible]
Use of Leachate Collection System		NA	6		[illegible]
Use of Gas Collection Systems		NA	2	[illegible]	[illegible]
Site Closure		NA	8	[illegible]	[illegible]
Subsurface Flows		[illegible]	7	[illegible]	[illegible]

Number of Assumed Values = [illegible] Out of 9

Percentage of Assumed Values = [illegible] %

Number of Missing and Non-Applicable Values = [illegible] Out of 9

Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = [illegible] Out of 25

Overall Percentage of Assumed Values = [illegible] %

OVERALL SCORE [illegible]

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

APPENDIX I

SITE RATING FORMS

SITES LOCATED ON DOE PROPERTY

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RB-3

Location DOE Tech. Area III

Owner/Operator Sandia Labs

Comments Active low-level radioactive waste burial site

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12		36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = [illegible] Out of 6

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 6

Percentage of Missing Values = [illegible] %

SUBTOTALS 57 138

SUBSCORE 41

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	[illegible]	10	[illegible]	[illegible]
Level of Water Contamination	[illegible]	15	[illegible]	45
Type of Contamination, Soil/Biota	[illegible]	5	[illegible]	15
Distance to Nearest Surface Water	[illegible]	4	[illegible]	[illegible]
Depth to Groundwater	[illegible]	7	[illegible]	[illegible]
Net Precipitation	[illegible]	6	[illegible]	[illegible]
Soil Permeability	[illegible]	6	18	18
Bedrock Permeability	NA	4	[illegible]	[illegible]
Depth to Bedrock	NA	4	[illegible]	[illegible]
Surface Erosion	[illegible]	4	[illegible]	[illegible]

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = [illegible] %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = [illegible] %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 100

Reason for Assigned Hazardous Rating:

Active landfill of both classified and unclassified radioactive wastes.

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	[illegible]	7	[illegible]	[illegible]
Hazardous Waste Quantity	[illegible]	[illegible]	[illegible]	[illegible]
Total Waste Quantity	[illegible]	4		[illegible]
Waste Incompatibility	[illegible]	3		[illegible]
Absence of Liners or Confining Beds		6	[illegible]	[illegible]
Use of Leachate Collection System		6	[illegible]	[illegible]
Use of Gas Collection Systems	[illegible]	2		[illegible]
Site Closure — Impermeable cover for classif. wastes; Permeable cover for unclassified wastes	[illegible]	8	[illegible]	[illegible]
Subsurface Flows	[illegible]	[illegible]		[illegible]

Number of Assumed Values = ___ Out of 9 — SUBTOTALS ___ ___

Percentage of Assumed Values = ___% — SUBSCORE ___

Number of Missing and Non-Applicable Values = ___ Out of 9 — (Factor Score Divided by Maximum Score and Multiplied by 100)

Percentage of Missing and Non-Applicable Values = ___%

Overall Number of Assumed Values = ___ Out of 25

Overall Percentage of Assumed Values = ___%

OVERALL SCORE ___

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site RB-1

Location DOE Tech Area II

Owner/Operator Sandia Labs

Comments

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	3	15	45	45
Distance to Reservation Boundary	3	6	18	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	36
Water Quality of Nearby Surface Water Body	0	6	0	18

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 69 138

SUBSCORE 50

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	[illegible]	10	[illegible]	[illegible]
Level of Water Contamination	[illegible]	15	[illegible]	45
Type of Contamination, Soil/Biota	[illegible]	5	[illegible]	15
Distance to Nearest Surface Water	1	4	4	12
Depth to Groundwater	1	[illegible]	[illegible]	[illegible]
Net Precipitation	[illegible]	6		[illegible]
Soil Permeability	[illegible]	6	[illegible]	[illegible]
Bedrock Permeability	NA	4		
Depth to Bedrock	NA	4		
Surface Erosion		4		[illegible]

Number of Assumed Values = [illegible] Out of 10

Percentage of Assumed Values = ____ %

Number of Missing Values = [illegible] Out of 10

Percentage of Missing Values = ____ %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

AD-A123 312   INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH HAZARDOUS MATERIA..(U) ENGINEERING-SCIENCE INC ATLANTA GA NOV 81 F08637-80-G-0009   4/4

UNCLASSIFIED   F/G 13/2   NL

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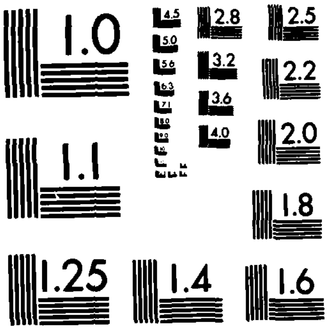

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 30

Reason for Assigned Hazardous Rating:

Old site, closed in 1959, incomplete records.

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
WASTE MANAGEMENT PRACTICES					
Record Accuracy and Ease of Access to Site		1	7	7	21
Hazardous Waste Quantity		3	7	21	21
Total Waste Quantity		0	4	0	12
Waste Incompatibility	Assumed	0	3	0	9
Absence of Liners or Confining Beds		3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection Systems		2	2	4	6
Site Closure		0	8	0	24
Subsurface Flows		0	7	0	21

Number of Assumed Values = 1 Out of 9

Percentage of Assumed Values = 11 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicable Values = 0 %

SUBTOTALS [illegible] [illegible]

SUBSCORE [illegible]

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 1 Out of 25

Overall Percentage of Assumed Values = 4 %

OVERALL SCORE 45

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

WASTE DISPOSAL SITE AND SPILL AREA

ASSESSMENT AND RATING FORM

Name of Site: DOE Chemical Waste Landfill

Location: DOE Area 3

Owner/Operator: Sandia

Comments: Active since ~1960

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
RECEPTORS				
Population Within 1,000 Feet	0	4	0	12
Distance to Nearest Drinking Water Well	1	15	15	45
Distance to Reservation Boundary	1	6	6	18
Land Use/Zoning	2	3	6	9
Critical Environments	0	12	0	[illegible]
Water Quality of Nearby Surface Water Body	0	6	0	[illegible]

Number of Assumed Values = 0 Out of 6

Percentage of Assumed Values = 0 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 27 138

SUBSCORE 20

(Factor Score Divided by Maximum Score and Multiplied by 100)

RATING FACTOR	FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
PATHWAYS				
Evidence of Water Contamination	1	10	10	30
Level of Water Contamination	0	15	0	45
Type of Contamination, Soil/Biota	0	5	0	15
Distance to Nearest Surface Water	0	4	0	12
Depth to Groundwater	1	7	7	21
Net Precipitation	0	6	0	18
Soil Permeability	3	6	18	18
Bedrock Permeability	NA	4	0	0
Depth to Bedrock	NA	4	0	0
Surface Erosion	0	4	0	12

Number of Assumed Values = 0 Out of 10

Percentage of Assumed Values = 0 %

Number of Missing Values = 2 Out of 10

Percentage of Missing Values = 20 %

SUBTOTALS 35 171

SUBSCORE 20

(Factor Score Divided by Maximum Score and Multiplied by 100)

WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

Points	
30	Closed domestic-type landfill, old site, no known hazardous wastes
40	Closed domestic-type landfill, recent site, no known hazardous wastes
50	Suspected small quantities of hazardous wastes
60	Known small quantities of hazardous wastes
70	Suspected moderate quantities of hazardous wastes
80	Known moderate quantities of hazardous wastes
90	Suspected large quantities of hazardous wastes
100	Known large quantities of hazardous wastes

SUBSCORE 100

Reason for Assigned Hazardous Rating:
Active hazardous chemical waste disposal landfill

RATING FACTOR		FACTOR RATING (0-3)	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
	WASTE MANAGEMENT PRACTICES				
Record Accuracy and Ease of Access to Site	Records incomplete, but good access control	0	7	0	21
Hazardous Waste Quantity		3	7	21	21
Total Waste Quantity	Wastes well segregated.	0	4	0	12
Waste Incompatibility		0	3	0	9
Absence of Liners or Confining Beds	Acid pit lined. Others not.	3	6	18	18
Use of Leachate Collection System		3	6	18	18
Use of Gas Collection Systems		3	2	6	6
Site Closure	Portions still open	2	8	16	24
Subsurface Flows		0	7	0	21

Number of Assumed Values = [illegible] Out of 9
Percentage of Assumed Values = [illegible] %
Number of Missing and Non-Applicable Values = [illegible] Out of 9
Percentage of Missing and Non-Applicable Values = [illegible] %

SUBTOTALS 79 150
SUBSCORE 53
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 0 Out of 25
Overall Percentage of Assumed Values = 0 %

OVERALL SCORE 42
(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

APPENDIX J

INTERIM PRIMARY DRINKING WATER STANDARDS

LIST OF PRIORITY POLLUTANTS

APPENDIX J

EPA INTERIM PRIMARY AND PROPOSED SECONDARY DRINKING WATER STANDARDS

PARAMETER	MAXIMUM LEVEL	
A. Interim Primary		
Arsenic	0.05	mg/l
Barium	1.0	mg/l
Cadmium	0.01	mg/l
Chromium (VI)	0.05	mg/l
Fluoride	1.4 to 2.4	mg/l
Lead	0.05	mg/l
Mercury	0.002	mg/l
Nitrate (as N)	10	mg/l
Selenium	0.01	mg/l
Silver	0.05	mg/l
Endrin	0.002	mg/l
Lindane	0.004	mg/l
Methoxychlor	0.1	mg/l
Toxyphene	0.005	mg/l
2,4-D	0.01	mg/l
2,4,5-TP Silvex	0.01	mg/l
Radium	5 pCi/l	
Gross Alpha	15 pCi/l	
Gross Beta	4 millirem/yr	
Turbidity	1 TU	
Coliform Bacteria	1/100 ml	
B. Secondary		
Chloride	250	mg/l
Copper	1	mg/l
Foaming Agents	0.5	mg/l
Hydrogen Sulfide	0.05	mg/l
Iron	0.3	mg/l
Manganese	0.05	mg/l
Sulfate	250	mg/l
Total Dissolved Solids	500	mg/l
Zinc	5	mg/l
Color	15 Color Units	
Corrosivity	Non-corrosive	
Odor	3 threshold Odor Number	
pH	6.5 to 8.5	

APPENDIX J (Continued)

LIST OF PRIORITY POLLUTANTS

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benzidine
6. carbon tetrachloride (tetrachloromethane)
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether (mixed)
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. chloroform (trichloromethane)
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,3-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. ethylbenzene
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
44. methylene chloride (dichloromethane)
45. methyl chloride (chloromethane)

46. methyl bromide (bromomethane)
47. bromoform (tribromomethane)
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
65. phenol (4APP)
66. bis(2-ethylhexyl) phthalate
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene (1,2 benzanthracene)
73. benzo(a)pyrene (3,4-benzopyrene)
74. 3,4-benzofluoranthene
75. *benzo(k)fluoranthane(11,12-benzofluoranthene)*
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene (1,12-benzoperylene)
80. fluorene
81. phenanthrene
82. 1,2,5,6-dibenzanthracene
83. indeno (1,2,3-cd) pyrene
84. pyrene
85. tetrachloroethylene
86. toluene
87. trichloroethylene
88. vinyl chloride (chloroethylene)
89. aldrin
90. dieldrin
91. chlordane (tech. mixture & metabolites)
92. 4,4'-DDT
93. 4,4'-DDE (p,p'-DDX)
94. 4,4'-DDD (p,p'-TDE)

95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100.heptachlor
101.heptachlor epoxide
102.alpha-BHC
103.beta-BHC
104.gamma-BHC (lindane)
105.delta-BHC
106.PCB-1242 (Arochlor 1242)
107.PCB-1254 (Arochlor 1254)
108.PCB-1221 (Arochlor 1221)
109.PCB-1232 (Arochlor 1232)
110.PCB-1248 (Arcohlor 1248)
111.PCB-1260 (Arochlor 1260)
112.PCB-1016 (Arochlor 1016)
113.Toxaphene
114.Antimony (Total)
115.Arsenic (Total)
116.Asbestos (Fibrous)
117.Beryllium (Total)
118.Cadmium (Total)
119.Chromium (Total)
120.Copper (Total)
121.Cyanide (Total)
122.Lead (Total)
123.Mercury (Total)
124.Nickel (Total)
125. Selenium (Total)
126.Silver (Total)
127.Thallium (Total)
128.Zinc (Total)
129.2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

APPENDIX K

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

APPENDIX K

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

Acft Maint: Aircraft Maintenance

AD: Air Force Systems Command's Armament Division

AD/DE: Directorate of Civil Engineering

AD/DEEVE: Environmental Protection Planning Section

AD/DEEVN: Natural Resources Planning Section

AD/PA: Public Affairs Office

AD/SGPE: Bioenvironmental Engineering Services

AF: Air Force

AFB: Air Force Base

AFLC: Air Force Logistics Command

AFR: Air Force Regulation

AFSC: Air Force Systems Command

AG: Adjutant General

AGE: Aircraft Ground Equipment

ARROYOS: A dry gully; a rivulet or stream

ARTESIAN: Ground water contained under hydrostatic pressure

AQUICLUDE: Poorly permeable formation that impeeds ground-water movement and does not yield water to a well or spring

AQUIFER: A geologic formation, group of formations, or part of a formation that is capable of yeilding water to a well or spring

AVGAS: Aviation Gasoline

AVW: State of New Mexico symbols for a privately owned industrial well

AWACS: Airborne Warning and Control System

AWADS: Airborne Warning and Detection System

BIOACCUMULATE: Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals

CERF: Civil Engineering Research Facility

CERL: Construction Engineering Research Laboratory

CLOSURE: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water

COE: Corps of Engineers

CONFINED AQUIFER: An aquifer bounded above and below by i[illegible]meable beds or by beds of distinctly lower permeability than that of the [illegible]ifer itself

CONTAMINATION: The degradation of natural water quality t[illegible]e extent that its usefulness is impaired; there is no implication of any [illegible]cific limits since the degree of permissible contamination depends upon [illegible]ntended end use or uses of the water

DACT: Dissimilar Air Combat Tactics .

DASC: Direct Air Support Center

DER: Department of Environmental Regulation

Det: Detachment

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground water

DOD: Department of Defense

DOE: Department of Energy

DOWNGRADIENT: In the direction of lower hydraulic head; the direction in which ground water flows

DPDO: Defense Property Disposal Office

DUMP: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics; dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers

ECM: Electronic Countermeasures

EFFLUENT: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment

EPA: Environmental Protection Agency

EROSION: The wearing away of land surface by wind or water

FAA: Federal Aviation Administration

FACILITY: Any land and appurtenances thereon and thereto used for the treatment, storage and/or disposal of hazardous wastes

FCDNA: Field Command; Defense Nuclear Agency

FCT: Fire Control Training

FLOOD PLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year

FLOW PATH: The direction or movement of ground water and any contaminants that may be contained therein, as governed principally by the hydraulic gradient

FRENCH DRAIN: An underground, rock lined catch basin

GE: General Electric Company

GROUND WATER: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure

GROUND WATER RESERVOIR: The earth materials and the intervening open spaces that contain ground water

HALF-LIFE: The time required for half the atoms present in radioactive substance to disintegrate

HARDFILL: Disposal sites receiving construction debris, wood, miscellaneous spoil material

HAZARDOUS WASTE: A solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste

HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations

HQ: Headquarters

HWMF: Hazardous Waste Management Facility

INCOMPATIBLE WASTE: A waste unsuitable for commingling with another waste or material because the commingling might result in generation of extreme heat or pressure, explosion or violent reaction, fire, formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential for reacting violently, formation of toxic dusts, mists, fumes, and gases, volatilization of ignitable or toxic chemicals due to heat generation in such a manner that the likelihood of contamination of ground water or escape of the substance into the environment is increased, any other reaction which might result in not meeting the Air, Human Health, and Environmental Standard

INFILTRATION: The flow of liquid through pores or small openings

INWS: Interservice Nuclear Weapons School

IRP: Installation Restoration Program

ITRI: Lovelace Inhalation Toxicology Research Institute

KAFB: Kirtland Air Force Base

KFD: Kirtland Fire Department

LEACHATE: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water

LINER: A continous layer of natural or man-made materials beneath or on the sides of a surface impoundmnet, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate

LWDS: Liquid Waste Disposal System

LYSIMETERS: A thimble or cup device used for extracting ground water samples at various depths

MAC: Military Airlift Command

MAS: Military Air Service

MOA: Military Operating Area

MONITORING WELL: A well used to measure ground-water levels and to obtain samples

MSL: Mean Sea Level

NWTD: Nuclear Weapons Training Detachment

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon

OT&E: Operations, Training and Evaluation

PCB: Polychlorinated Biphenyls are highly toxic to aquatic life; they persist in the environment for long period and are biologically accumulative

PERCOLOATION: Movement of moisture by gravity or hydrostatic pressure thorugh interstices of unsaturated rock or soil

PD-680: Cleaning solvent, safety solvent, Stoddard's solvent

pH: Negative logarithm of hydrogen ion concentration, measurement of acids and bases

PL: Public Law

POL: Petroleum, Oils and Lubricants

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose

RB: Radioactive burial site

RCRA: Resource Conservation and Recovery Act

RECHARGE AREA: An area in which water is absorbed that eventually reaches the zone of saturation in one or more aquifers

RECHARGE: The addition of water to the ground-water system by natural or artificial processes

RECON: Reconnaissance

RL: Radioactive lagoon

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes enviromental hazards

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water

SLUDGE: The solid residue resulting from a manufacturing or wastewater treatment process which also produces a liquid stream

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water suply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923)

SPILL: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water

STORAGE OF HAZARDOUS WASTE: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste

TAC: Tactical Air Command

TA: Test Area

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism

TRANSMISSIVITY: The rate at which water is transmitted through a unit width under a unit hydraulic gradient

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous

TS: Training site

UPGRADIENT: A location, usually within a soil system, opposite to the prevailing flow direction of groundwater

USAF: United States Air Force

WATER TABLE: Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere

WL: Waste Lagoon

APPENDIX L

REFERENCES

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